INDIA RUBBER WORLD

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OUR 61st YEAR

A BILL BROTHERS PUBLICATION

JANUARY, 1950

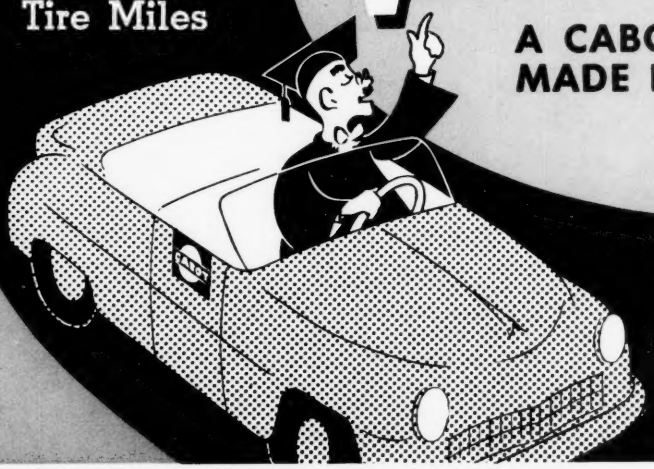
CABOT

Everybody knows—

"IT'S BETTER WITH Vulcan-3"

Cabot Road Tested More Than 1,000,000 Tire Miles

A CABOT HAF BLACK MADE FROM OIL



GODFREY L. CABOT, INC.
77 FRANKLIN STREET, BOSTON, MASS.

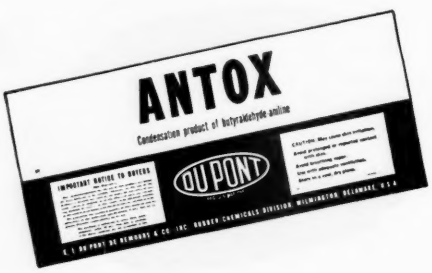
Use the Du Pont Antioxidant that Fits Your Needs

	FOR PROTECTION AGAINST		
	NORMAL AGING	HEAT AGING	FLEX FAILURE
1 NEOZONE A	Excellent	Good	Good
2 AKROFLEX C	Excellent	Excellent	Very Good
3 THERMOFLEX A	Excellent	Excellent	Excellent
4 ANTOX	Very Good	Very Good	No Effect

NEOZONE A—As a general-purpose antioxidant, Neozone A is outstanding in effectiveness and economy. It provides excellent protection against normal aging and improves the heat-aging and flex-cracking resistance of both natural and synthetic rubber stocks. Equal antioxidant protection may be obtained using Neozone D. However, Neozone A is much more soluble in elastomers, hence is preferable.

AKROFLEX C—Second only to Thermoflex A for protecting stocks against all three types of deterioration. Gives protection equal to Thermoflex A against normal aging and heat, but is slightly less effective against fatigue failures.

THERMOFLEX A—For applications requiring *maximum protection against all three types of deterioration* . . . normal aging, heat, and flexing . . . Thermoflex A is unmatched. Especially effective as an inhibitor of flex cracking. Specify Thermoflex A for difficult jobs where only the best antioxidant protection will do.



ANTOX—Produces excellent aging stocks which discolor only slightly on exposure to sunlight. Antox also results in stocks having very good heat resistance. And, too, Antox activates cure . . . reduces accelerator requirements.

DU PONT
REG. U.S. PAT. OFF.

E. I. du Pont de Nemours & Co. (Inc.),
Wilmington 98, Delaware

BETTER THINGS FOR BETTER LIVING
. . . *THROUGH CHEMISTRY*

Tune in to Du Pont "Cavalcade of America," Tuesday Nights—NBC Coast to Coast

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Get *extra* advantages in rubber compounding with Good-rite RESIN 50

REG U S PAT OFF

This easy-processing stiffening agent
Saves masterbatching . . .
Improves molding and flow characteristics . . .
Gives better flex life, higher elongation . . .
Gives better abrasion resistance.

JUST look over those bonus advantages you get with Good-rite Resin 50. It's easy to see how this ideal reinforcing agent for natural and American rubber products helps you make important savings in time and money.

Good-rite Resin 50 is a high styrene-butadiene copolymer. It is made as a white, free-flowing powder. It can be compounded in a broad range of sales-attracting colors.

Resin 50 provides a positive reinforcement for rubber compounds, makes them more easily handled because it acts as a plasticizer at processing temperatures. Quality products in any hardness range can be obtained. Typical uses are in shoe soling compounds, floor tiling — many more are possible.

Write for complete information. Find out how you may use Good-rite Resin 50 to help cut your costs—and improve your products. Please address Dept. CB-1, B. F. Goodrich Chemical Company Company, Rose Building, Cleveland 15, Ohio.

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Reg. U.S. Pat. Off.
American Rubber

B. F. Goodrich Chemical Company
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For long flex life, you ought to know

The records made with **Philblack* O!**

Write for the technical data on Philblack O! Read the results of flexing tests! Look at the graphs and comparisons! You'll see that Philblack O gives up to 40% longer flex life than channel black in natural and synthetic rubbers. And Philblack compounds have from 10% to 30% better abrasion resistance, too. For a long, useful life, use Philblack O!

The best way to prove all this is to send for a trial order of this tough HAF black . . . and see for yourself! Available in bags or in bulk.

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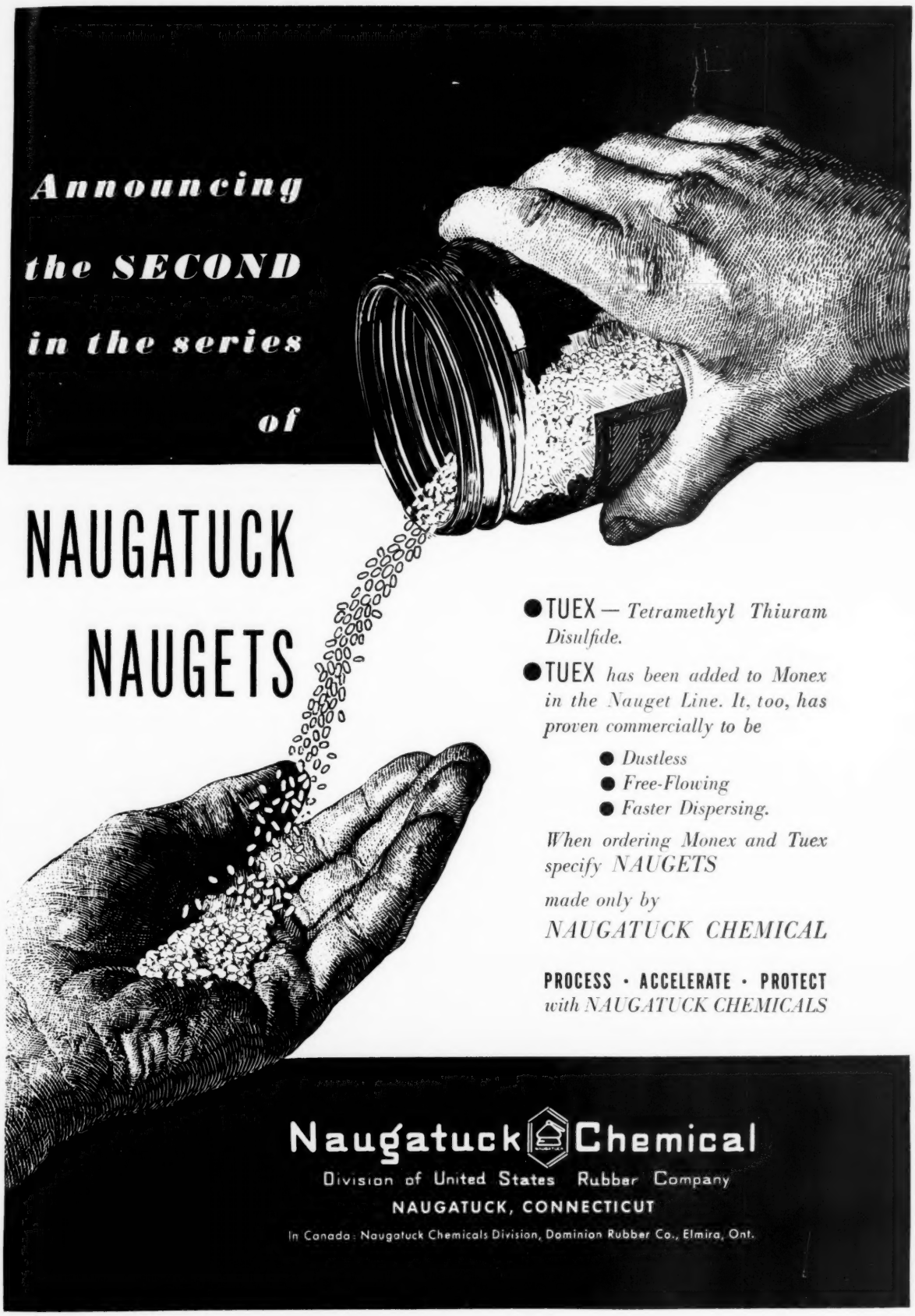
NAUGATUCK NAUGETS



● TUEX — *Tetramethyl Thiuram Disulfide.*

● TUEX *has been added to Monex in the Nauget Line. It, too, has proven commercially to be*

- *Dustless*
- *Free-Flowing*
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PROCESS · ACCELERATE · PROTECT
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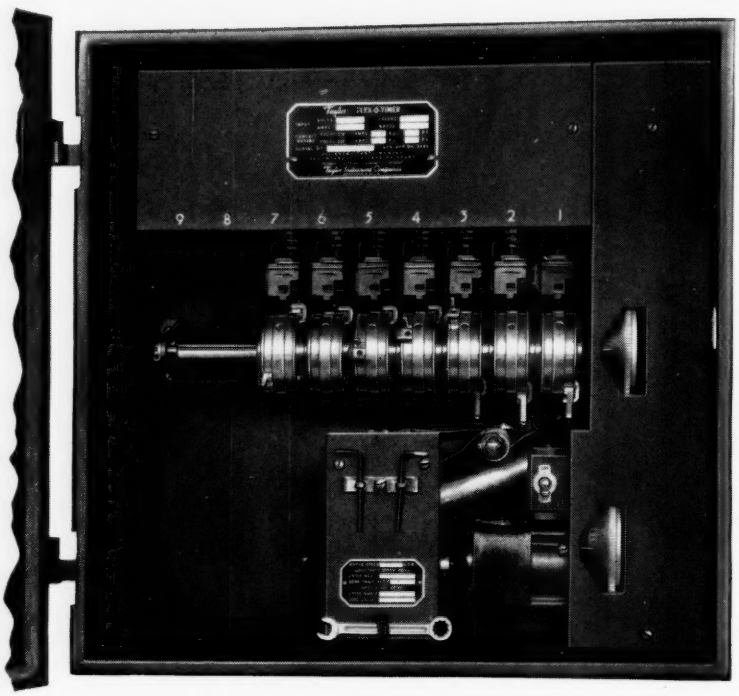
Meet Taylor's brand new family of

FLEX-O-TIMER*

Time Cycle Controllers re-designed for even greater flexibility



YES, there is a whole new family of Taylor FLEX-O-TIMER Time Cycle Controllers—precision built to meet all your processing requirements!

Here's just one of the family!

(1) It controls a group of as many as 9 pneumatic or 9 electrical functions (or any combination of each)—with all the intermediate steps within a process automatically controlled for the duration of the manufacturing operation. Particularly adaptable for such applications as *tire presses* or *horizontal and vertical vulcanizers.*

Meet the other members too!

(2) The 10 to 18 function FLEX-O-TIMER for complex control according to a predetermined schedule and over a specifically timed period. Perfect for such applications as *horizontal and vertical vulcanizers.*

(3) The 1 to 5 function FLEX-O-TIMER for simpler applications like *belt presses, mechanical rubber products presses* or *tire presses.*

(4) The 1 to 3 function FLEX-O-TIMER—specifically developed for *tube molding presses.*

(5) The single function FLEX-O-TIMER . . . particularly useful for *condensate removal* applications.

Here Are Just a Few Outstanding Features of the New, Re-designed FLEX-O-TIMERS:

1. ***Greater Flexibility.*** Wide range of cycle bands from 14 seconds to 540 minutes available to meet practically every time cycle controller requirement. Cycle duration may be either fixed or varied. As many as 18 control functions may be contained in one instrument.

2. ***Newly Designed, Segmented Drum.*** Individual aluminum drum segments are mounted on a central shaft. One segment is used for each control function with provisions made to receive the amount of actuating pins necessary to operate a function as many as 15 times. Entire cycle drum assemblies are readily interchangeable, enabling you to pre-set cycles for applications where components within cycle vary periodically.

3. ***Unit Parts Are Easier to Reach.*** Universal dust-tight case has hinged door with bayonet-action latch. All unit assemblies are front-mounted—easy to reach when you open the doors. Thus, terminal strips, air valves and switches, snap-operators, cycle drum, solenoid. motor and gear train can easily be removed for repair or replacement. Terminals, control functions and gears are all plainly numbered so that connections or gear train changes can be made in the field.

4. ***Easier and Simpler Adjustments.*** Actuating pins of die-cast aluminum are easy to remove and set. Finger-tip adjustment of speed dial provides as many as 80 different cycle times.

For complete details, write today for the new Taylor FLEX-O-TIMER Catalog 98154. It tells the whole new and improved FLEX-O-TIMER story. Just one more way of showing you that we're in business to help you keep costs down and quality up with Taylor Accuracy. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.*

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Pick your package—

PLIOLITE S-6 comes the way you want it

As one more service to its customers—Goodyear supplies **Pliolite S-6** in a choice of easily-handled packages. **Pliolite S-6** comes in 200-pound drums or in 50-pound bags, so you can request this use-proved copolymer in whichever container best meets your handling facilities.

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Regardless of the form of **Pliolite S-6** you order, when you include it in your gum, black or non-black loaded stocks, this copolymer resin will improve tensile, tear, hardness, stiffness, flex-life and abrasion resistance. Whenever you want a low-gravity, light-colored stock of high strength and easy processability, you can use **Pliolite S-6** with confidence. For details and sample, write:

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2. ***It Improves*** the appearance of your product for its uniform coating stimulates greater consumer interest.
3. ***It's Economical*** because its high dilution potential (without losing efficiency) allows one gallon to cover 15,000 sq. ft.
4. ***It's Safe*** being a wax in water emulsion, it eliminates the fire and health hazards of volatile-solvent based finishes.

BEACOFINISH can be applied by dipping, sponging, spraying or brushing—dries in about 20 minutes—faster if force-dried—to give a hard protective coating of great elasticity.

BEACOFINISH may be ordered in Neutral or Black, in varying degrees of luster from brilliant to dull. It is so concentrated, from one drum you can obtain potentially up to five drums of superior coating for your products.

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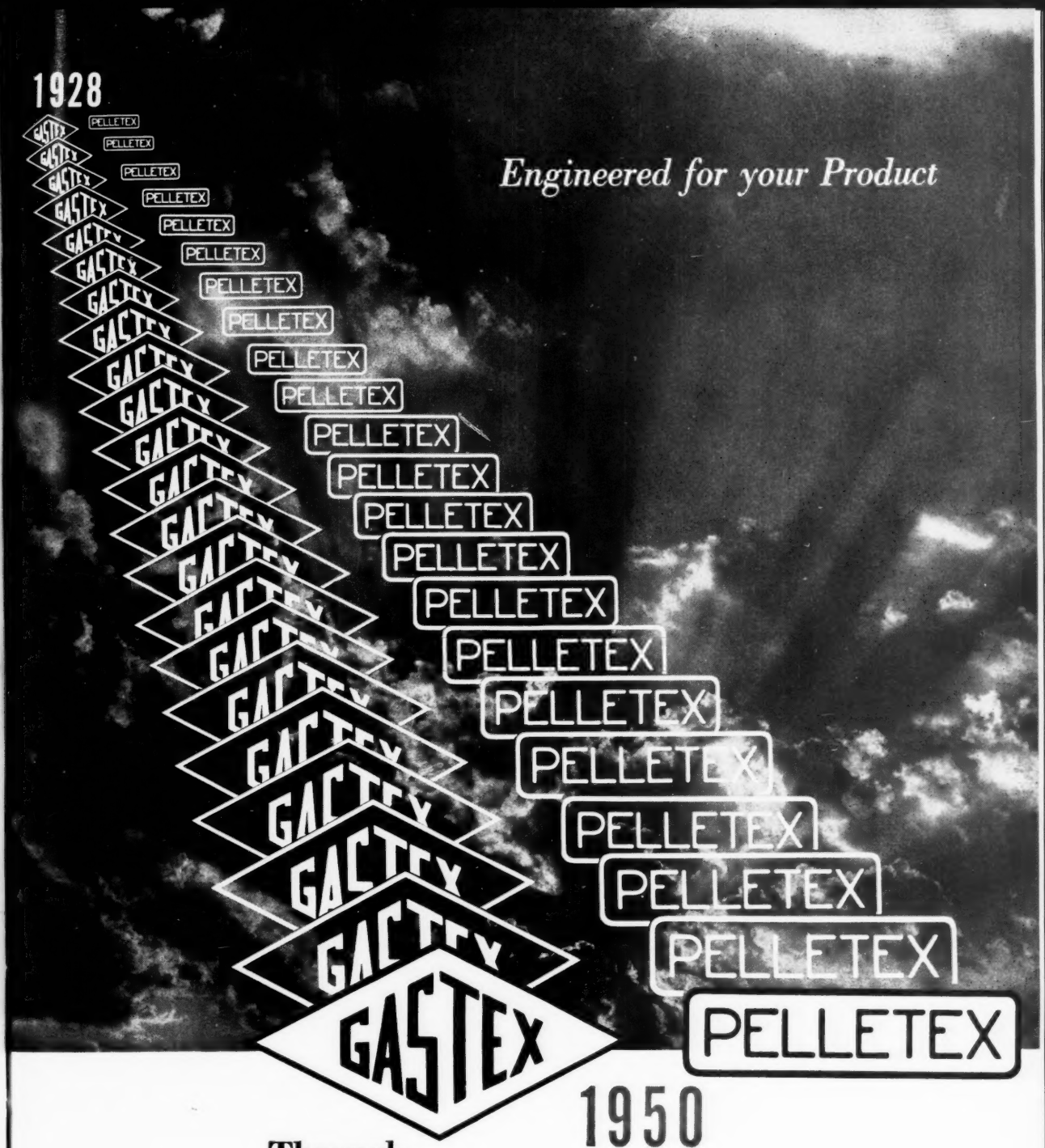

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Through The Years Quality CARBON BLACKS

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The B. E. Dougherty Company, Los Angeles and San Francisco • Delacour-Gorrie Limited, Toronto

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STEEL MESH

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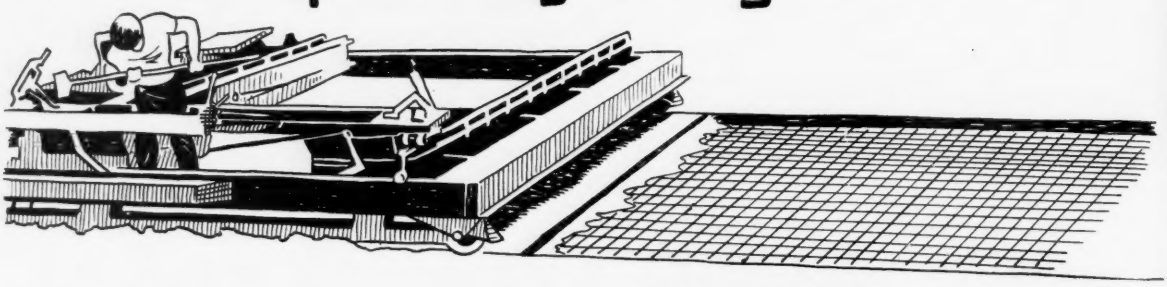

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Rubber Compounders:

Supplement your use of clays, carbon blacks, calcium silicates, etc., with

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...assure easier mixing, better extruding or calendering and improved molding of your stocks

LOOK FOR:

Higher hardness without brittleness
Improved flex crack growth resistance
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Unlimited color possibilities (non-staining)

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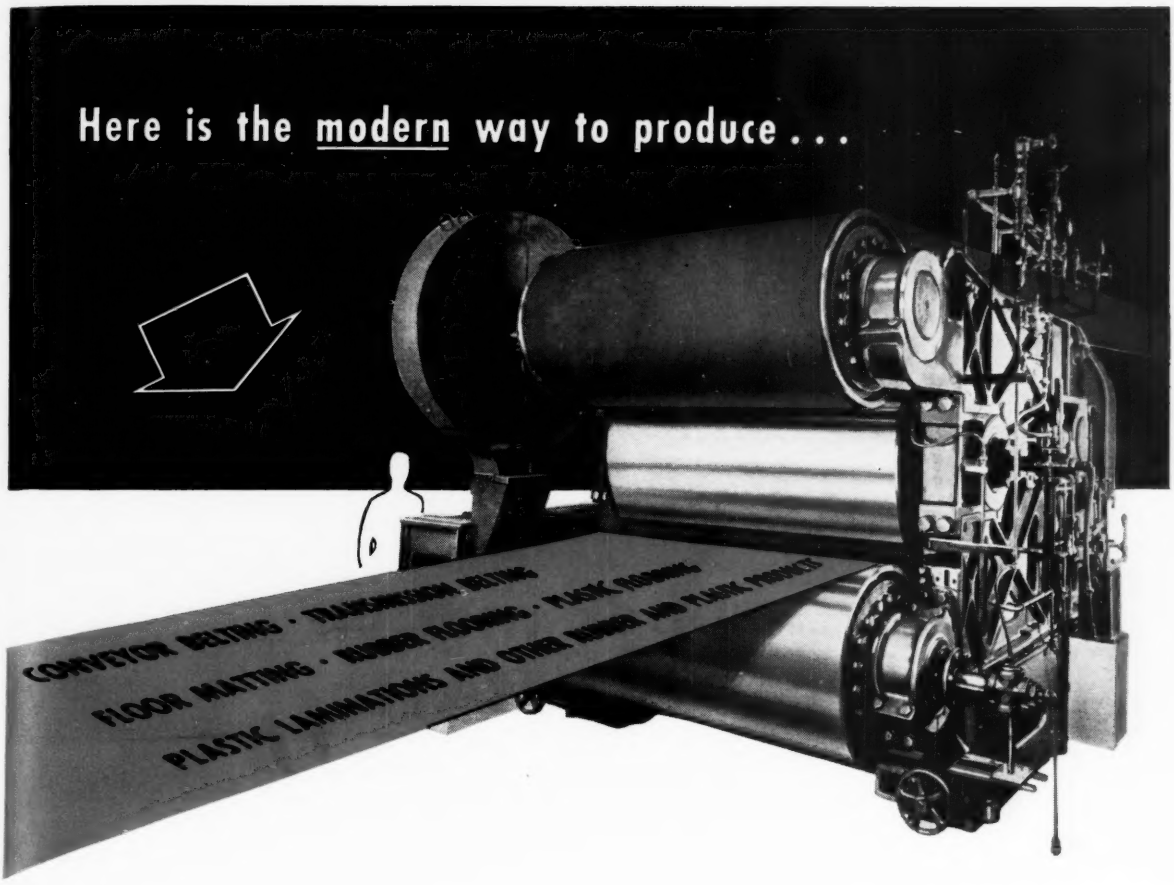
Here is the modern way to produce . . .


CONVEYOR BELTING · TRANSMISSION BELTING
FLOOR MATTING · RUBBER FLOORING · PLASTIC FLOORING
PLASTIC LAMINATIONS AND OTHER RUBBER AND PLASTIC PRODUCTS

This machine, the ROTOCURE,* has a number of advantages where the run of any one size or type of materials is great enough. For example:

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FB-508

* The ROTOCURE is a patented machine built under license from Boston Woven Hose & Rubber Co.

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..in the rubber industry... get these THERMALL Profit Builders!!

Increase Banbury output, save labor and power costs.

Shorten breakdown time on mills, save labor and power costs.

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Improve molding quality and reduce curing defects.

Increase capacity of mixing on open mill by heating crude rubber and reclaimed rubber.

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Break down ***Hard Stocks*** easier, faster, save labor and power costs.

Thermall equipment is extremely economical to operate.

Thermall Electronic Heating equipment generates heat right where it is wanted, ***"in the material itself"***.

Thermall equipment will speed up checking materials in laboratory, such as mixed stock, checking for proper dispersion of pigments in rubber . . . checking of cord fabrics for moisture content . . . and all other types of materials.

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THERMALL

ELECTRONIC RUBBER HEATING

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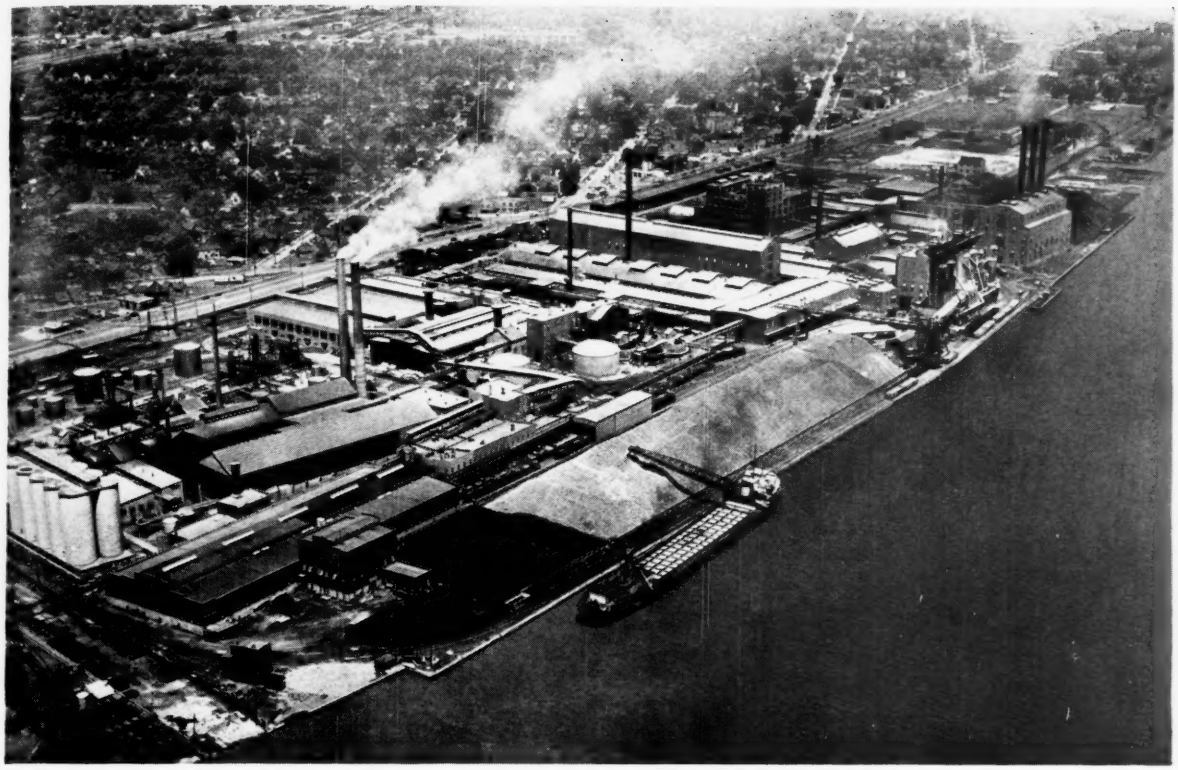
GUARANTEED PERFORMANCE . . . *or it doesn't cost you a cent!*



Air view of Wyandotte's South Plant, showing one of Wyandotte's Great Lakes fleet at dock-side.

We'd like you to know the whole family

You may find it profitable to get acquainted with Wyandotte's large but steadily growing family of organic and inorganic chemicals, for these three important reasons:

1. Wyandotte, with its own sources of raw materials — coal, limestone and salt — can furnish you with a steady, dependable supply of the chemicals you need — year in, year out.

2. Because of its strategic Great Lakes location, Wyandotte can ship to you by rail, truck or by water. There's a good chance that geography can help cut your costs.

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Such products as Wyandotte Precipitated Calcium Carbonate are ready to go to work for you. You'll find that this smooth, readily dispersible pigment makes an effective but economical extender and reinforcing agent in making high-grade rubber compounds.

We will be glad to send you complete data on this or any other Wyandotte chemicals for the Rubber Industry. Just write:

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50% FASTER IN '50

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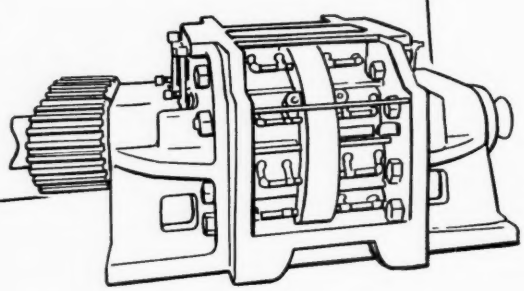
It will be smarter to be thrifty in '50. Call on us for the most for your money in Banbury Service. Inquire about our new rental plan.



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Completely rebuilt No. 9 bodies, spray or jacketed, also No. 3A spray type, now ready for quick interchange for worn bodies.

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To demonstrate the unequaled abrasion-resistant material we use in hard-surfacing rotors, rings, and mixing chamber, we will send FREE to any Banbury owner a unique tool you can make very useful in home or office. Just request on your company letterhead.

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1950 - 1840 - 110 YEARS PRODUCING FATTY ACIDS FOR INDUSTRY!

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5 grades of *Stearic Acid* varying in composition and physical characteristics.

7 high-stability *Oleic Acids* with lowest unsaponifiable content . . . Emersol 233 LL Elaine is the purest oleic acid available commercially.

Vegetable Fatty Acids—cottonseed, soya, coconut. *Hydrogenated Fatty Acids. Glycerides.*

Contact us or our representatives to find out how Emery can help you select the right fatty acid.

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of the

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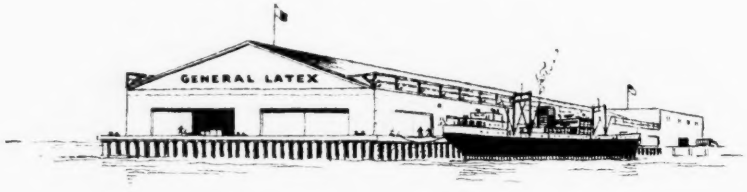
This pier is equipped with the most modern pumping and bulk storage facilities. It will provide a second port of entry for Harrisons & Crosfield Malayan latex and expedite service to General Latex customers in the Midwest, Central Atlantic, and Southern States.



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STABELAN E gives excellent light fastness and outdoor aging . . . It improves the transparency of clear films . . . It gives films that do not absorb water and do not "blush".

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A BETTER **STABILIZER** FOR HIGH TEMPERATURES, ULTRAVIOLET AND OUTDOOR AGING . . .

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HARWICK STANDARD CHEMICAL CO.

AKRON 8, OHIO

BRANCHES: BOSTON, TRENTON, CHICAGO, LOS ANGELES

Do your rubber products say "Come hither"?

Use Du Pont "Alamask" odorants
TRADE-MARK

Nobody wants to buy a product with an unpleasant odor! But now—with Du Pont "Alamask" odorants—both your natural, neoprene and other synthetic rubber products can have a clean and pleasing odor. Unpleasant odors can be neutralized throughout.

Du Pont odor chemists, working with rubber technologists, have developed a series of "Alamask" odorants. These carefully tested odorants neutralize off-odors or give a pleasant scent, whichever you desire. You'll use them successfully on Latex, bonded fibers, adhesives, dipped goods, blown sponge and many other rubber products. There is no significant effect on processing characteristics or rate of cure.

Du Pont "Alamask" odorants
TRADE-MARK

Du Pont laboratory skill is at your service. Send for the booklet "Odorants for the Rubber Industry"—or ask us for specific recommendations for your individual problems. Write—E. I. du Pont de Nemours & Co. (Inc.), Organic Chemicals Department, Aromatics Section, Wilmington 98, Delaware. Branch Offices: Atlanta, Boston, Charlotte, Chicago, New York, Philadelphia, Providence, San Francisco.

DU PONT
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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

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ORLD

CARBON BLACKS

UNITED CARBON COMPANY, INC.

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Use

UNITED BLACKS

Flames in a channel process plant.

KOSMOBILE 77-EPC
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United channel blacks have an enviable record for uniform quality and satisfactory performance. Years of experience and skill govern their manufacture.

United channel blacks are specification-made for use in your rubber, and they are repeatedly and thoroughly quality-checked by us in a number of ways.

United channel blacks are properly pelleted for ready breakdown and dispersion in your mixing and milling equipment.

United channel blacks are dependable for satisfactory processing at all stages and for quick, tight cures.

United channel blacks possess that high reinforcement so essential for the satisfactory performance of your goods in service.

UNITED CARBON COMPANY, INC.

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You Will Want THIS BOOK

Multiple Opening
This picture is typical of multiple opening platen type presses of strain plate construction. This particular press is intended for curing rubber molded products but similar presses are used for press polishing and many like applications. The strain plates are preferred for some work because they provide greater rigidity than strain rods and prevent radiation and heat loss from steam-heated platens. A variety of accessories are available for spacing the platens, opening them, and connecting them to the steam supply. Various elevator arrangements can also be supplied for rapid loading and unloading.
STRAIN PLATE TYPE
PLATEN PRESSES
A 2200-ton eight-opening molding press with heated platens 60 square. The method of connecting the platens to the steam and exhaust manifolds is one of a number of designs that are available.
STRAIN ROD TYPE
ERIE
FOUNDRY CO.,
ERIE, PA., U.S.A.
Bulletin No. 350
HYDRAULIC PRESSES

Erie Foundry
HYDRAULIC PRESSES

For Rubber Working
Multiple Opening Platen
Self-Contained Forming
Mechanical Goods Presses
Extrusion Presses
Special Purpose Presses
Abrasive Molding
Die Hobbing Presses
Light Precision Molding
Presses for Diverse Applications

Write for Your Copy of Bulletin 350

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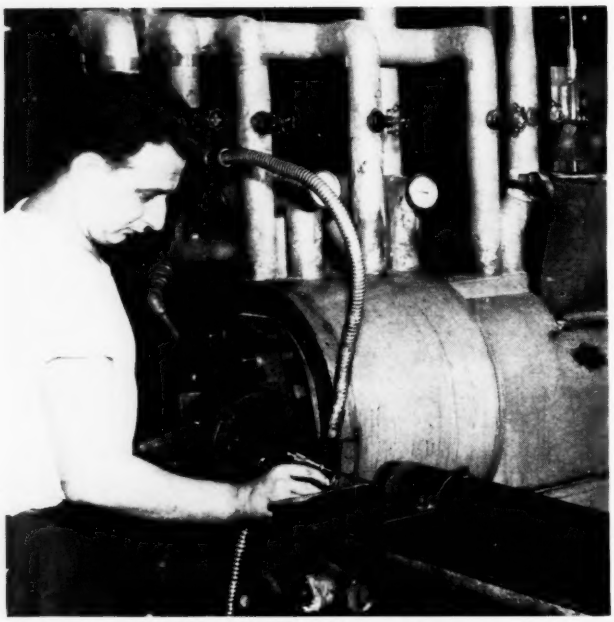

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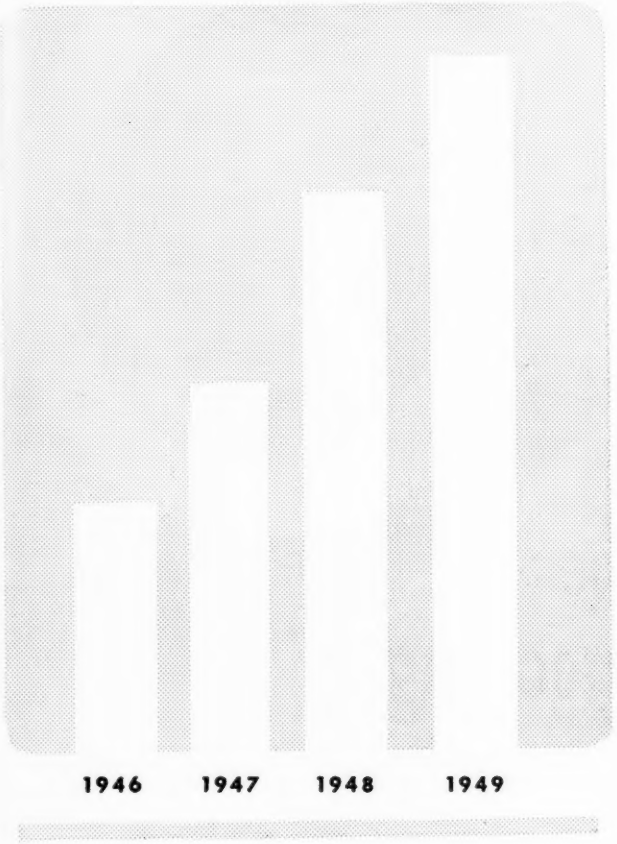

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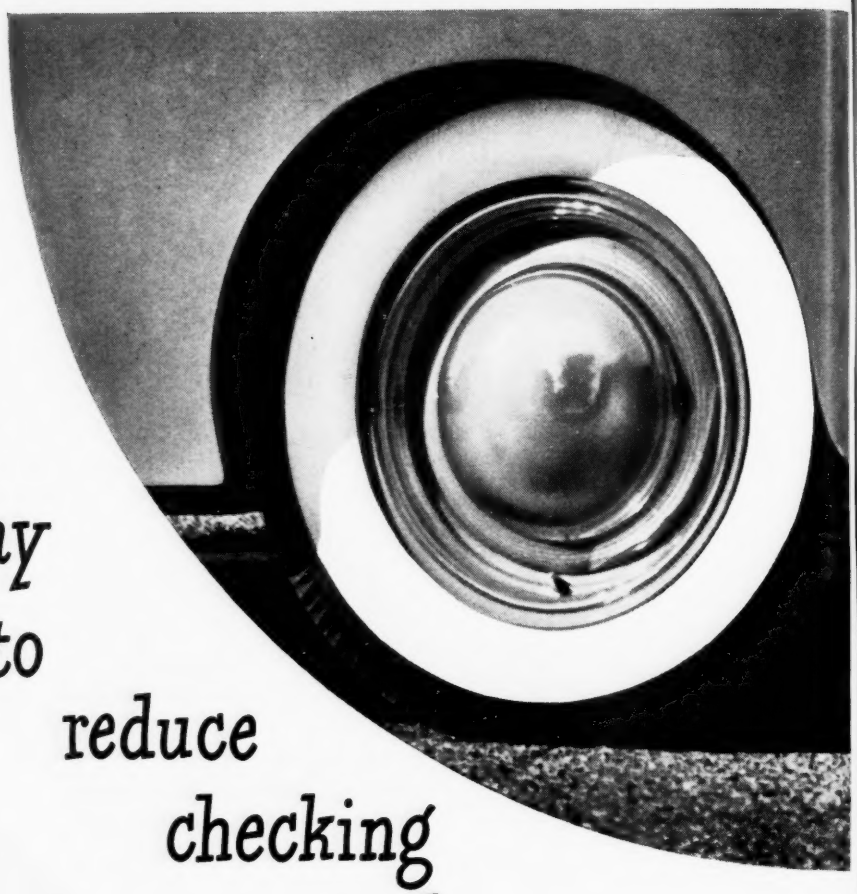

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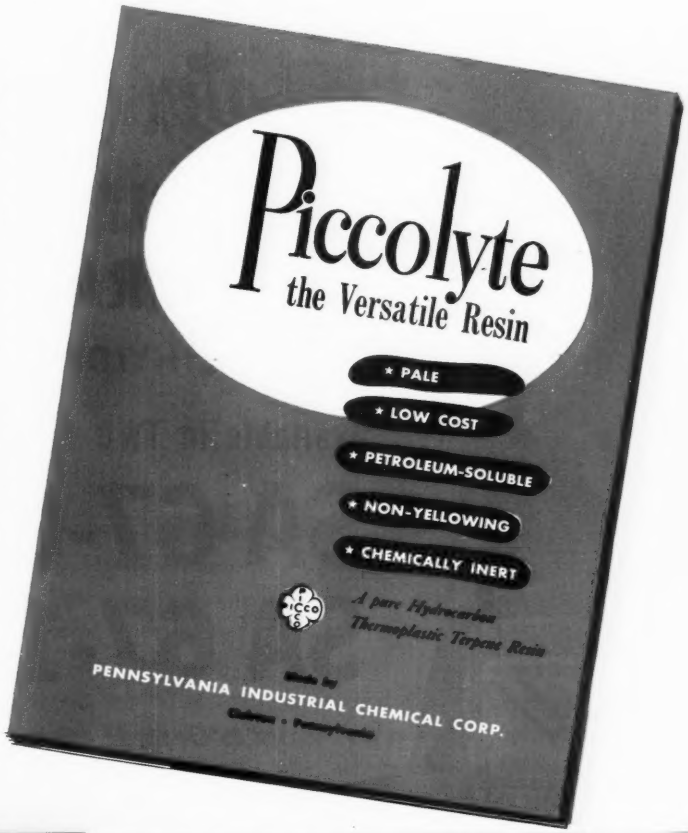

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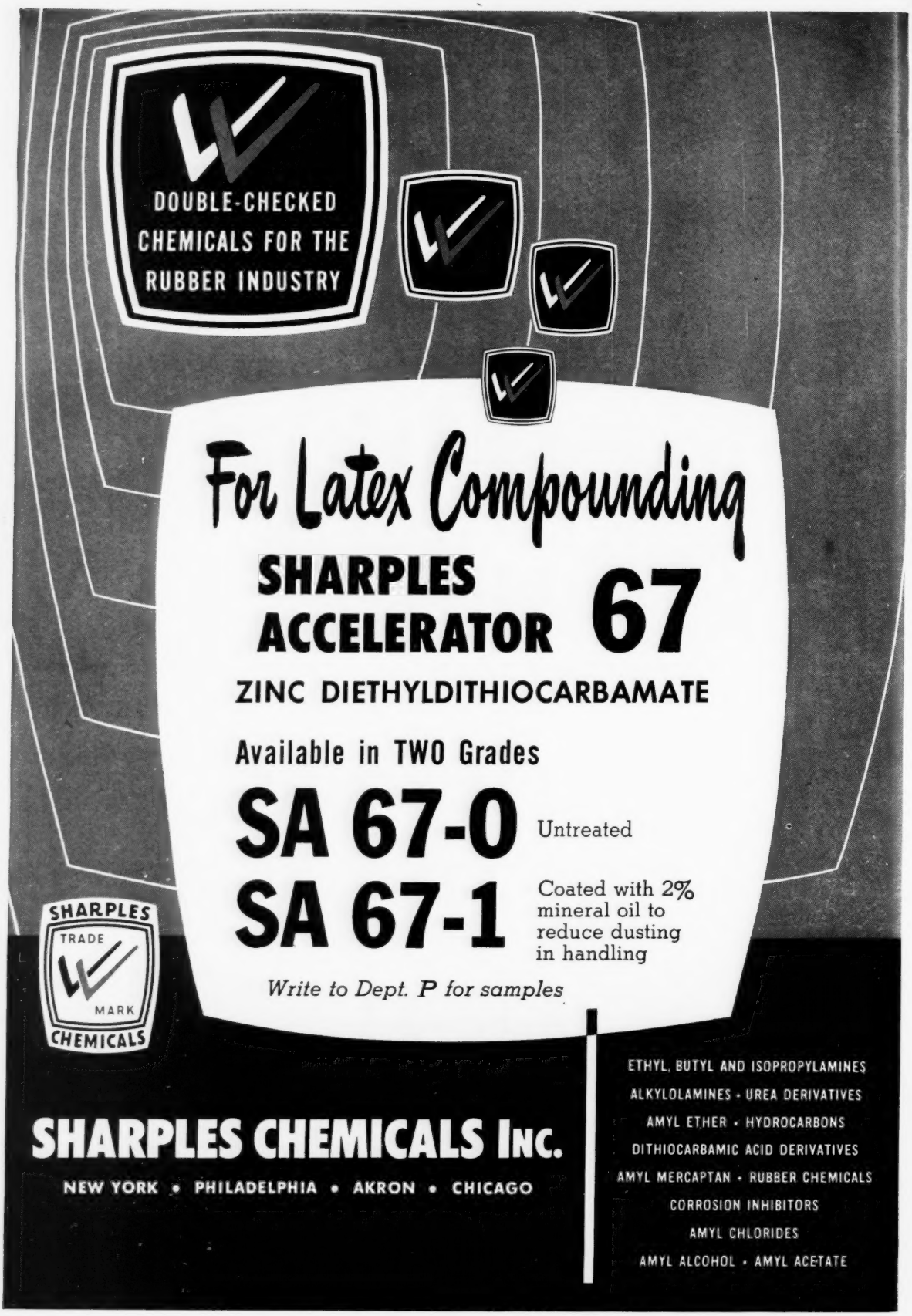
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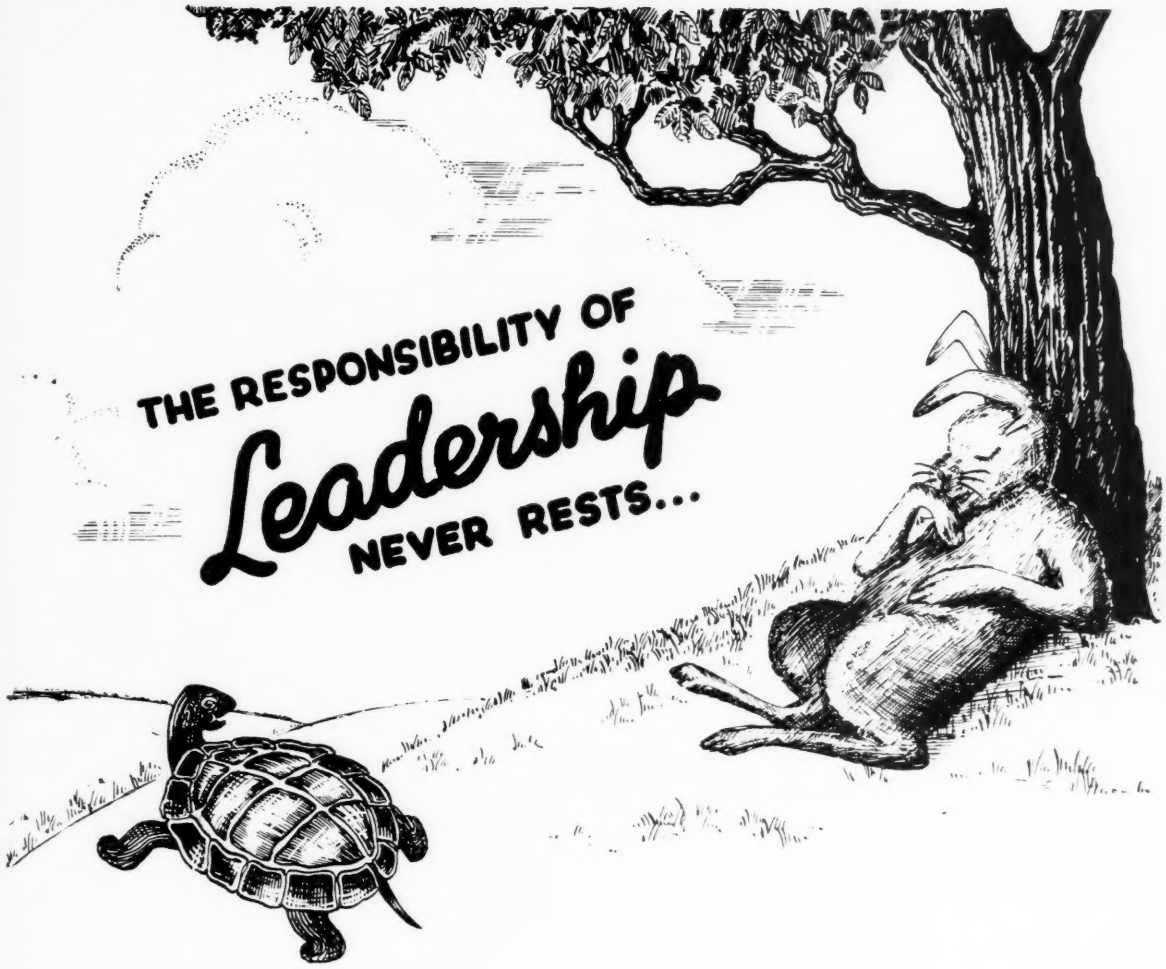

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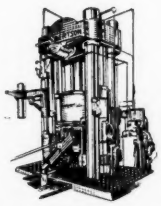

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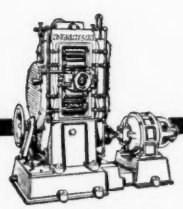

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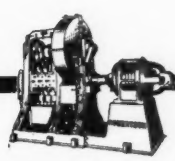

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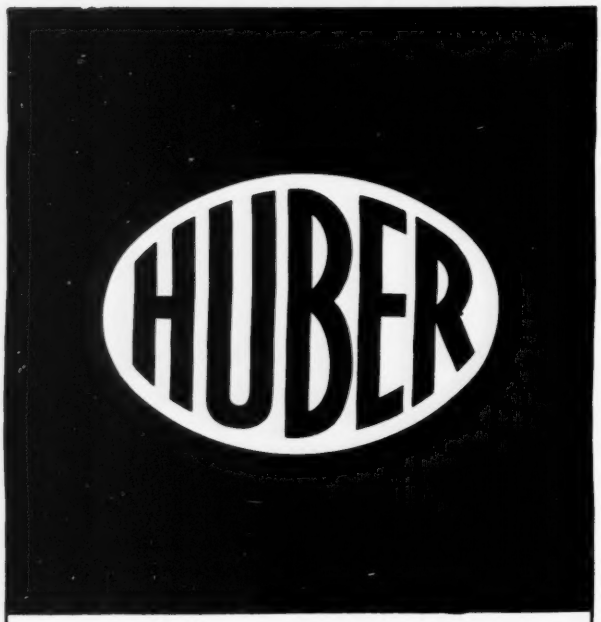

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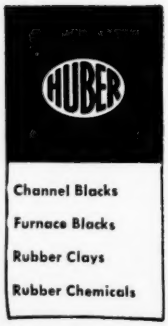

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The Importance of Controlling Heat Losses in Molding Operations[1]

R. E. Shrader[2] and W. N. Keen[2]

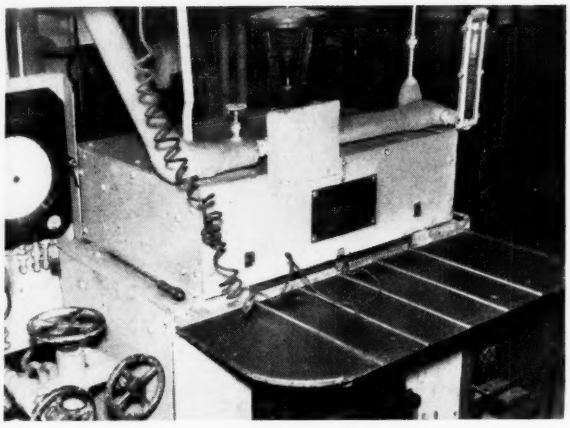

Fig. 1. Laboratory Press Showing Steel Rods on Press Apron and Insulation of Platens from Body of Press

FREQUENTLY, wide variations are found in the physical properties of vulcanizates, prepared from the same rubber mix, which have been found in various laboratories or factories under the same conditions of time and temperature. It is obvious that such variations are associated with a difference in the state of cure of the vulcanizates. This fact has been recognized by ASTM, and a standard method has been written (Sample preparation for Physical Testing of Rubber Products, ASTM D15-41) in which press operation is covered in detail. It is believed, however, that one of the sources of these variations in physical properties which receives too little attention is the temperature of the mold throughout a complete curing cycle. In general, in both the rubber factory and in the laboratory, molds are loaded and unloaded on a press apron or bench, with little or no consideration given to the temperature change of the mold during this operation.

It is the purpose of this paper to show the temperature variations which can be expected in a typical molding operation and suggest means of minimizing these variations.

It is well recognized that when starting with a cold mold a time of approximately 20 minutes[3] is required to bring the mold to the temperature of the press; however, it is generally considered that in succeeding unloading and loading cycles the change in temperature of the mold is insignificant. The work reported herein shows that the temperature drop of a mold during the unloading and loading portion of the curing cycle and the time required for the mold to return to platen temperature are undoubtedly important sources of variation in the physical properties of the resulting vulcanizates.

Experimental Details

The change in temperature of an eight-cavity 3- by 6- by 0.075-inch mold was studied during the unloading and loading cycle. This mold, measuring 18 by 18 inches and equipped with an iron-constantan thermocouple, was heated in a laboratory press (Figure 1) having 24- by 24-inch platens with a distortion tolerance of 0.0025-inch. The thermocouple, connected to a Brown Electronik recording potentiometer, was located in the body of the mold to a depth of six inches and midway between the sides. The press was so located in the press room that air movement in its vicinity was at a minimum and the room temperature during the course of study ranged from 35-38° C. (95-100° F.) The platens of the press were insulated from the body of the press by a mixture of asbestos and cement, commercially known as Transite, and the press was lagged and shielded as an additional aid in controlling the platen temperature. In no instance did the temperature of the press platens vary by more than ±0.28° C. (0.5° F.) as determined by thermocouples located at nine different points on each platen.

Cooling of Mold on Steel Apron

In the first experiment the mold was placed in the

[1] Presented before the Division of Rubber Chemistry, A. C. S., Sept. 22, 1949, Atlantic City, N. J. Contribution No. 80, from rubber laboratory, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

[2] E. I. du Pont de Nemours & Co.

[3] "ASTM Standards on Rubber Products—Committee D-11, February, 1949," p. 64. American Society for Testing Materials, Philadelphia, Pa. (1949).

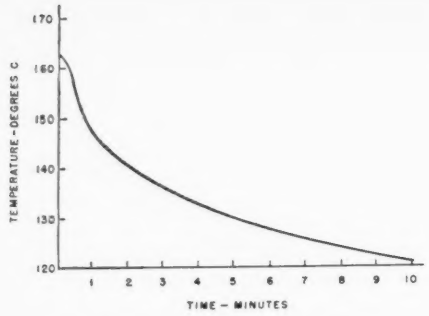

Fig. 2. Cooling of Mold on Steel Apron

press, and, after the recording potentiometer indicated that the mold was up to temperature 162.4° C. (324° F.), an additional 15 minutes were allowed to elapse to insure complete uniformity of temperature throughout the entire mold. The press was then opened, and the mold pulled out on to the press apron. The time-temperature curve of the mold, while resting on the steel press apron, is shown in Figure 2. As can be seen, the mold decreased from the curing temperature of 162.4° C. to 121° C. (324° F. to 250° F.) in a period of 10 minutes. The length of time required to unload and reload a mold depends primarily on the number of cavities and the complexity of the molded part. For the eight-cavity laboratory mold used, the time for this operation is not less than two minutes; whereas in a factory some molds may be out of the press for 15 minutes or longer. A standard time of five minutes for the mold to be out of the press was adopted for the remaining experiments.

Curing at higher temperature than 162.4° C. results in a greater change in the temperature of the mold, and curing at a lower temperature than 162.4° C. results in a smaller temperature change. Figure 3 shows the temperature change in the mold, with respect to time, when cooled from platen temperatures of 126.4, 153.2, and 162.4° C. (259, 307, and 324° F.). For convenience of comparison, the data have been plotted using the temperature variation from curing temperature as the ordinate. It can be seen from the figure that the general shapes of the curves are similar, varying only as to the magnitude of the temperature change at any given time. The temperature-time curves for the mold at intermediate platen temperatures fall between the curves shown.

Heat losses during the unloading and loading cycle can be due to conduction, convection and radiation, the amount of heat loss depends on the way the mold is handled during this operation. The heat loss due to convection and radiation during the initial cooling of the mold is small as compared to the heat lost by conduction. Therefore a study was made of the effect of insulating the mold from the press apron as a means of minimizing the heat lost by conduction.

Various insulating materials were installed on the surface of the press apron and studied as to their effect in reducing the heat lost by the mold. The effectiveness of two of the best insulating materials studied, Transite and an air medium, is illustrated by the curves shown in Figure 4. Transite ¼-inch in thickness offers approximately the same insulating qualities as does a ¼-inch air gap for the first two or three minutes after the mold is removed from the press. After about three minutes however, Transite allows a greater heat loss by conduction. The air medium which was used as an insulator between the mold and the apron was obtained by installing metal rods, or runners, on the press apron. Half-round rods, spaced on six-inch centers, were used to keep the area of contact between the rods and mold to a minimum. Stainless steel rods were used because of their low thermal conductivity.

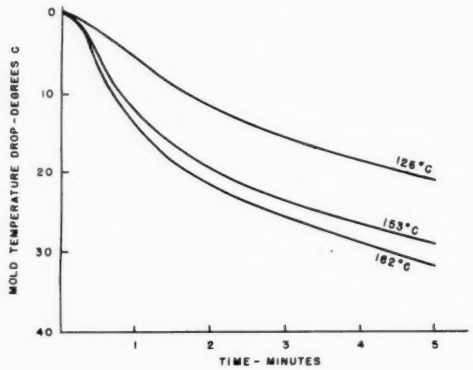

Fig. 3. Effect of Platen Temperature on Rate of Cooling

Since an air gap had proved to be a satisfactory medium of insulation, the effect of varying the thickness of the air gap was studied. Tests showed that there was only a negligible difference in insulating effect when the gap was varied from ⅛ to½-inch. Therefore an air gap of ¼-inch produced by attaching ½-inch half-round stainless steel rods to the press apron was adopted as standard for the laboratory press.

Up to this point only the first half, or the cooling portion, of the time—temperature curve during the unloading and loading cycle has been discussed. The heating portion of the cycle can also introduce variations in the physical properties of the resulting vulcanizates.

Effect of Platen Insulation on Mold Heating

A point which is often overlooked, when mold temperature is considered, is the rate of heat transfer from the press platen to the mold. The importance of proper press installation and insulation has been pointed out by Bimmerman,[4] who showed that a temperature difference of 2.8° C. (5° F.) existed between the bottom and the top platens of a three-platen press in the absence of insulation between the bottom platen and the ram cap. The effect on the rate of heat transfer to the mold obtained by insulating the platens from the body of the press is shown in Figure 5. These data were obtained on the same press; the only variable is the sheet of Transite placed between the platens and the body of the press.

TABLE 1. EFFECT OF PLATEN INSULATION ON RATE OF MOLD HEATING

Press Platen	Time for Mold to Rise in Temperature from 121° C. (250° F.) to		
	136° C. (275° F.)	149° C. (300° F.)	154° C. (310° F.)
Uninsulated	2.0	6.0	13.7
Insulated	1.2	3.4	5.5

As can be seen from these curves, the mold is up to platen temperature in 10 minutes in the case of the insulated platens as compared to approximately 18 minutes for the uninsulated platens. The data shown in Table 1 are taken from these curves and show the times required for the mold, having dropped to a temperature of 121° C. (250° F.) during the unloading and loading cycle, to reach 136, 149, and 154° C. (275, 300, and 310° F.), respectively. As will be noted, it takes approximately twice the time to reach a given temperature with the

[4] *Rubber Age (N. Y.)*, Dec., 1930, p. 307.

uninsulated platens as with the insulated ones. Thus platen insulation alone will increase the number of heats that may be made per day per press with less steam consumption and greater comfort to the press operators.

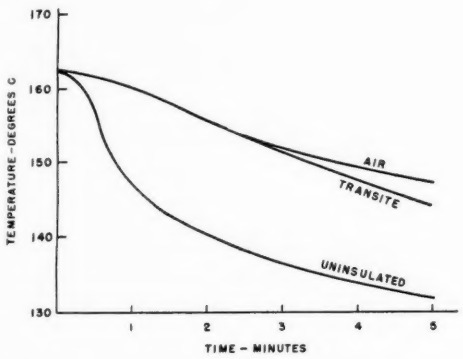

Fig. 4. Effect of Apron Insulation on Rate of Cooling

Distortion of press platens and molds is another factor which plays an important part in the rate of heat transfer from the platen to the mold. Press platens are often distorted to a concave shape by the use of too small molds. When this occurs and larger molds are used in the press, the air pocket between the mold and the platens results in non-uniform heating of the mold.

Effect of Insulation on Compound Cure Rate and Properties

In order to illustrate the practical significance of the data so far presented, the following typical mechanical goods compound was prepared:

Smoked sheets	100
Phenyl alpha naphthylamine (Neozone A)	1
Tetramethyl thiuram monosulfide (Thionex)	0.2
Zinc oxide	5
EPC carbon black	29.3
Stearic acid	1
Sulfur	2.5

This stock was cured for five, seven, and nine minutes at 153.2° C. (307° F.), using the various methods of insulation previously discussed. Table 2 summarizes the physical data for the resulting vulcanizates.

TABLE 2. EFFECT OF INSULATION ON PHYSICAL PROPERTIES

Minutes Cured at 153.2° C.	5	7	9
Stress in p.s.i. at 400% Strain			
No insulation	610	640	750
Insulated apron	640	750	900
Insulated platens	780	1060	1200
Complete insulation	1130	1140	1220

As will be noted, the most ideal conditions, i.e., insulated press platens and the mold insulated from the press apron, produce a good technical cure for this compound in a period of approximately five minutes at 153.2° C.

Removing the insulation from the press apron increases the time to approximately seven minutes. Removing the insulation from the press platens, but leaving the runners on the apron increases the time to approximately nine minutes.

The poorest conditions studied: namely, the absence of both press platen insulation and runners on the apron, require a time of at least 11 minutes (as determined by extrapolation) to obtain a good technical cure.

The practical significance of these data from the standpoint of both quality and quantity of product obtainable under factory conditions is readily apparent.

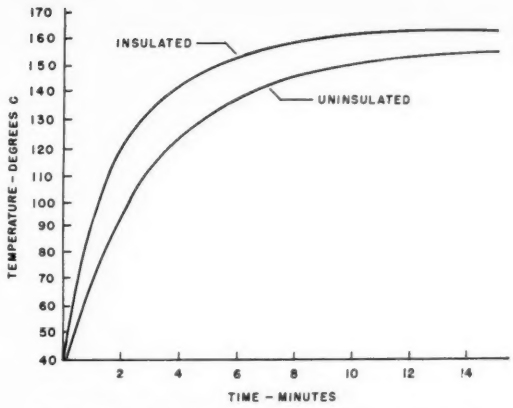

Fig. 5. Effect of Platen Insulation on Rate of Heating

Summary and Conclusions

The major factors which influence the mold temperature during cure are the temperature drop in the mold while it is out of the press and the rate of heat transfer between the press platen and the mold.

The mold temperature drop can be reduced approximately 50% in the range studied by insulating the mold from the press apron or bench. Equally important, however, is the fact that this temperature drop can be controlled within limits by standardizing the time in which the mold is out of the press between cures.

The heat transfer between the platen and the mold is a factor which must be studied individually for every press. The most important factors controlling this heat transfer are installation and insulation of the press, mold design, and condition of the mold and press with respect to distortion.

It is shown that with a typical mechanical goods compound in which a good technical cure is obtained in five minutes in a press with both platen and apron insulation requires as much as 11 minutes to obtain approximately the same state of cure in this same press without insulation.

Carbon Black Statistics—Third Quarter, 1949

Following are statistics for the production, shipments, producers' stocks and exports of carbon black for the third quarter of 1949. Production shipment, and inventory figures are compiled from reports made available to the Bureau of Mines by the National Gas Products Association and by direct reports from producing companies whose operations are not covered by the Association. Export figures are reported by the Department of Commerce, but are not fully comparable in a given month because of the lapse of time between loading and producing plants and clearance for export.

(Thousands of Pounds)

	July	August	September	First Nine Months
Production:				
Contact types	49,436	50,084	48,645	471,369
Furnace types	49,987	49,790	47,571	451,172
TOTALS	99,423	99,874	96,216	922,541
Shipments:				
Contact types	38,903	45,610	41,787	394,965
Furnace types	45,145	48,289	44,366	433,838
TOTALS	84,048	93,899	86,153	828,803
Producers' Stocks, End of Period:				
Contact types	91,196	95,670	102,528	102,528
Furnace types	102,824	104,325	107,530	107,530
TOTALS	194,020	199,995	210,058	210,058
Exports:				
Contact types	18,613	15,823	14,674	149,797
Furnace types	8,469	8,667	5,474	74,001
TOTALS	27,082	24,490	20,148	223,798

SOURCE: Bureau of Mines, United States Department of the Interior, Washington, D. C.

A New High Styrene Reinforcing Resin—Marbon "8000"[1]

C. R. Holt,[2] A. G. Susie,[3] and M. E. Jones[2]

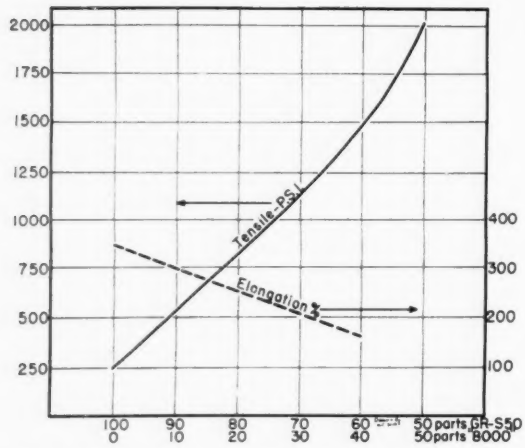

Fig. 1. Effect of Marbon "8000" on Tensile and Elongation of GR-S Gum Stock

THE high styrene resins have been accepted as compounding ingredients by the rubber industry. These versatile resins are extremely compatible with the various rubbers and have filled a need where high reinforcement is necessary. In general, the resins are used in rubber stocks requiring the following properties: good dielectric values; high hardness and stiffness; low specific gravity; light color; improved tear and flex-crack resistance; and improved mixing, processing, and mold flow characteristics. The properties and specific uses of these high styrene resins have been described quite fully in the literature.

The processing of these resins has received much attention from the industry, and this has led to the development of the easy processing types. Marbon Corp. had developed Marbon resins S and S-1, and the easy processing varieties were made in 1947 to meet the demand for such types. These easy processing resins eliminated the prior need of masterbatching and permitted the direct addition of the resin to the rubber, either on the mill or in the Banbury.

More recently the demand for a resin having higher unit reinforcing efficiency together with easy incorporation and processing has been expressed by rubber goods manufacturers. Marbon "8000" resin answers this demand. The properties of Marbon "8000" are similar in some respects to those of E. P. Marbon S and S-1 and are superior in other ways. Mixing and processing are generally easier and faster with Marbon "8000"; heat plasticizing action is greater, and physical properties are somewhat better, especially hardness, stiffness, compression set, tear resistance, and flex-crack resistance.

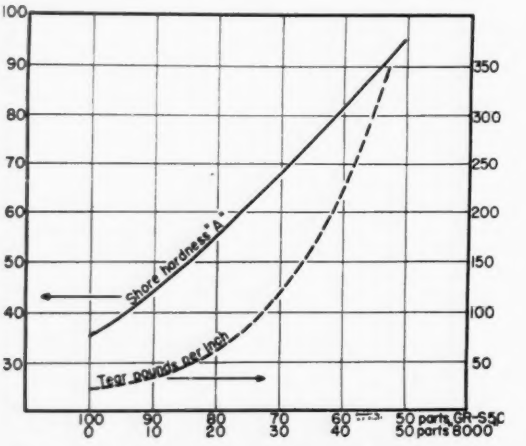

Fig. 2. Effect of Marbon "8000" on Hardness and Tear Strength of GR-S Gum Stock

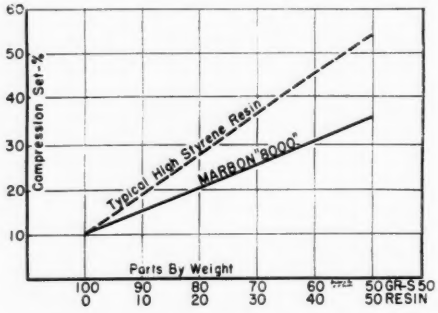

Fig. 3. Comparative Compression Set of Marbon "8000" and Typical High Styrene Resin in GR-S Gum Stock

Physical Properties

The effect upon tensile strength and elongation of increasing replacement of GR-S-50 by Marbon "8000" in a pure gum compound is shown in Figure 1. The tensile curve illustrates why Marbon "8000" makes possible the production of high tensile, low gravity, nonblack GR-S stocks; the gravity of the compounds increases from 1.02 to only 1.05 throughout the series. The increased tensile is also accompanied by increased modulus; the control stock has a 200% modulus of 146 p.s.i. which increases to over 2,000 p.s.i. with a stock containing 50 parts of resin. Elongation is described with increasing amounts of Marbon "8000".

Figure 2 shows the rapid increase in Shore "A" hardness along with improved tear resistance of the same pure gum GR-S-50 stock with increasing amounts of Marbon "8000." Figure 3 reveals the low compression set values of these pure gum GR-S-50 stocks obtained with Marbon "8000" reinforcement as compared to a similar series of mixes using a typical high styrene resin.

Other properties of the same gum stocks shown in Figures 1, 2, and 3 are similarly improved. Bureau of Standards abrasion values are tripled by increasing from 0 part to 50 parts of resin in the compound. Green

[1] Presented before Chicago Rubber Group, Chicago, Ill., May 20, 1949.
[2] Marbon Corp., Gary, Ind.
[3] Now with Armour Research Foundation, Chicago.

(uncured) shrinkage is reduced by two-thirds, and rebound decreased by about one-third, as compared to the control stock.

Numerous physical properties of cured compounds can be bettered through the use of Marbon "8000." The improvement in electrical properties, hardness, stiffness, flexural deadness, compression set, and tear is outstanding in comparison to conventional non-black reinforcing agents. Low gravity and light color are maintained; while abrasion and flex-crack resistance is substantially increased. These reinforcing properties of Marbon "8000" are due not only the mechanical strengthening and stiffening the resin imparts to a mix, but also to the fact that the resin vulcanizes along with the rubber. The state of cure of the resin is never so great as to embrittle a properly compounded stock, yet the thermoplasticity of the cured compound is reduced below that of a similar stock compounded with straight heat-softening resin plasticizers. Because of the vulcanizable nature of Marbon "8000", it is generally acceptable to replace RHC with the resin, and no adjustment usually need be made for change in rate of cure.

The advantages of compounding neoprene and nitrile rubber stocks with Marbon "8000" are two-fold: such stocks are not only well reinforced in physicals and improved in processing properties, but considerable direct cost reduction can also be obtained by replacing part of the synthetic with the resin. This point is also true in GR-S and natural rubber stocks in that higher amounts of fillers can be tolerated. For example, less expensive grades of natural rubber can be used with Marbon "8000" resin to obtain specific properties.

Natural and synthetic rubber compounds containing Marbon "8000" show greatly improved resistance to oxidation. High durometer compounds required to meet aging specifications are conveniently made by using this resin for part of the total RHC. Resistance to light discoloration and staining is also improved as the resin content is increased.

Processing Characteristics

Earlier types of high styrene resins necessitated masterbatching at high temperatures; whereas the new easy processing Marbon "8000" does not require masterbatching and can be mixed direct in a one-stage operation. The mixing procedure for Marbon "8000" in a rubber batch consists of incorporation of the resin and dispersion or fluxing after incorporation.

The first stage, incorporation, depends upon the particle size of the resin, the friability of the particles, and the uniformity of particle size. A friable granular material, such as the "8000" resin, is easy to handle in weighing-up operations. The effective size of the particles, once the resin is added to the batch, is extremely fine owing to the friability of the granules, and incorporation is rapid.

Dispersion or fluxing of the resin, the second stage, is almost entirely dependent upon the softening point of the resin and is directly affected by the maximum temperature of the batch. In Banbury mixing this offers little difficulty since the frictional heat of mixing serves to raise the stock temperature to the resin flux point. This point is also true of heavily loaded open mill stocks. In some instances it is desirable to add part of the fillers to the rubber before adding the resin so that the dispersion point of Marbon "8000" is reached more rapidly with consequent reduction in mixing time.

The stage in the mixing operation at which fluxing takes place is unimportant insofar as the physical properties of the cured stock are concerned. The earlier in the mixing cycle the resin is fluxed, however, the sooner the plasticizing action of the resin is obtained, and the sooner the stock is better able to handle large volumes of filler. Very soft stocks or gum mixes which build up very little frictional heat should be helped along by the use of steam heat on the mill rolls. Naturally, a lower softening point resin such as Marbon "8000" requires less heat for fluxing and will disperse at a lower temperature in a shorter time.

The more efficient plasticizing action of Marbon "8000" resin also permits better mixing at lower temperatures with less danger of scorch and lower heat-history and in many instances permits the use of more filler, less oil plasticizer and helps eliminate the need of prebroken rubber. High-Mooney GR-S polymers are best used to advantage by plasticizing with Marbon "8000" in order to retain the better physical properties and improve mixing and processing. Conversely, the smooth-milling low strength GR-S polymers modified with divinylbenzene are strengthened considerably by Marbon "8000" at no expense to processing.

Combinations of Marbon "8000" with low temperature GR-S polymers are especially good. The bar graphs of Figure 4 show the substantial improvements in physical properties obtained with reinforcement of low temperature GR-S as compared with reinforcement of GR-S-50 in a white sole stock. The improved properties are quite pronounced; while processing of the two stocks is comparable owing to the plasticizing action of the resin. In tests of Marbon "8000" reinforcement of low temperature GR-S as compared to GR-S-50 in "Nuclear"-type sole compounds of high durometer, the low temperature polymer again showed higher hardness (Shore "A" 98 as compared to 95 for the GR-S-50 stock), increased stiffness, an increase in abrasion resistance of approximately 20-25%, and slightly better aged flex-crack growth resistance.

It can also be noted that modifications of mixed stocks needed to adjust to particular processing conditions or variable physical requirements can be made by simply adding Marbon "8000" to the stock on the warm-up mill or by a short-cycle blending operation in the Banbury.

In calendering and tubing operations Marbon "8000" offers many benefits. Reclaim and neoprene stocks become less tacky and heat sensitive, and firmer stocks capable of taking faster handling operations are obtained. Nitrile rubber compounds become more plastic and less knotty; while GR-S and natural rubber stocks become stronger and smoother at calendering temperatures. The design pick-up of the stock from the calender face roll is sharpened by use of the resin, and deeper embossing is made possible with many types of stocks. Loss of calendered runs by pressing in the books or reels is reduced by use of the resin.

Scorch problems with calendering and tubing stocks are lessened owing to the heat plasticizing action of Marbon "8000" resin, and the production of burned calender stock is minimized. Uncured shrinkage is considerably reduced even with stocks containing low loadings of mineral or black fillers, and holding calendered sheet stock to accurate gage is made easier. Calender scrap becomes firmer and drier, permitting more reruns or easier work-away. Fabric penetration of skim coating compounds is improved, and air-streaking reduced because of the ability of the resin-containing stock to hold small rolling banks. Tubing stocks containing Marbon "8000" are characterized by smooth surfaces, minimized swell, less scorch, and faster tubing rate.

The molding of highly loaded stocks is improved with the addition of "8000" resin in that faster mold flow

results, more efficient flow and knitting around inserts is obtained, surface gloss and hardness is improved, and hot tear strength is increased. The removal of undercut or intricate pieces is made easier because of the more plastic state of the hot stock; a temporary distortion of such mold items is easily accomplished with no permanent effect.

Applications

High hardness compounds, such as rubber shoe soling and floor tile, find many advantages in using Marbon "8000" to improve processing, molding, appearance, and performance. Soling stocks containing the resin show good stiffness and deadness, high abrasion and tear resistance, and excellent flex-crack resistance. Flex-crack data after aging for typical high durometer sole compounds are shown in Figures 5 and 6.

Figure 5 shows aged flex-crack data for a natural rubber stock containing 80 parts smoked sheet and 20 parts resin; in one case Marbon "8000", and the other a typical high styrene resin. Quarter-inch strips (12 Iron soling) were aged for 24 hours at 100° C. and then run on the Ross flex machine. The definite advantage Marbon "8000" imparts in resisting flex-crack growth is apparent. Shore "A" durometer values were 93 for the "8000" stock and 90 for the typical high styrene resin sole. The bar graph at the right side of the figure shows the comparison between these same two stocks in abrasion resistance.

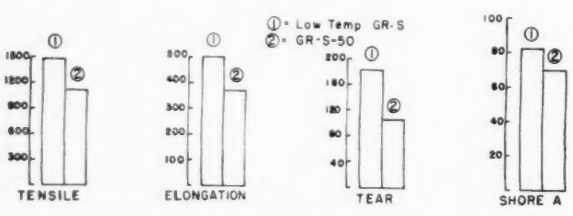

Fig. 4. Comparative Reinforcement of Marbon "8000" in GR-S-50 and Low Temperature GR-S Stocks

Figure 6 shows the aged flex-crack curves for a GR-S soling containing 70 parts of GR-S-50 and 30 parts of resin. The exceptional flex-crack resistance of Marbon "8000" is again illustrated. The Shore "A" hardness of the "8000" stock in this case was 97, as compared with 93 for the stock containing the typical high styrene resin.

Floor tile stocks containing 5-10 parts of "8000" resin mix faster, handle better, and give greater hardness and tear strength, better abrasion resistance, less spread and indentation, and show no tendency to split or delaminate. Press roll stocks and gasket materials can be made to a Shore "A" hardness of 80 or higher with low compression set, high tear and abrasion resistance, and uniform hardness, while possessing good tack and building properties in the uncured state.

By use of Marbon "8000," hard rubber compounds can be made with reduced sulfur content and faster cures, with no sponginess or blowing and no drop in durometer hardness or impact strength. Curves illustrating the effect of Marbon "8000" in hard rubber stocks are shown in Figure 7. This is a direct comparison on a natural hard rubber compound loaded with hard rubber dust and containing 30 parts of sulfur. Curve 1 indicates a stock containing 55 parts smoked sheet and 45 parts Marbon "8000"; while curve 2 shows the same stock containing 100 parts of smoked sheet and no resin. It is quite evident that the cure time of the resin-bearing stock to equivalent tensile, hardness, and greater rigidity is approximately one-half that required for the stock containing no resin.

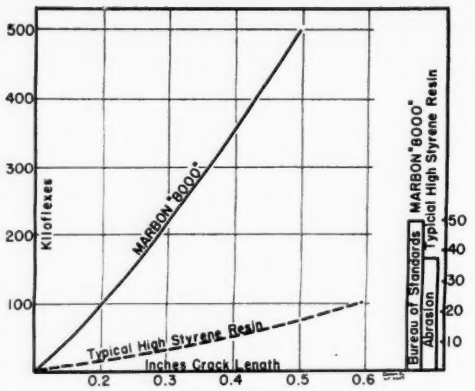

Fig. 5. Comparative Aged Flexing Properties of Marbon "8000" and Typical High Styrene Resin in Natural Rubber Soling

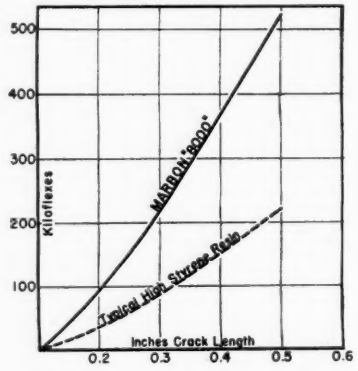

Fig. 6. Comparative Aged Flexing Properties of Marbon "8000" and Typical High Styrene Resin in GR-S Shoe Soling

The stock containing no resin was made with 45 parts of sulfur instead of 30 parts. This mix, when compared with the resin-rubber stock of lower sulfur content, gave higher tensiles (up to 8,600 p.s.i.), but showed no change in softening point, impact strength, and durometer hardness. In addition, compounds containing "8000" resin show much less tendency to blow when cured in thick

(*Continued on page 423*)

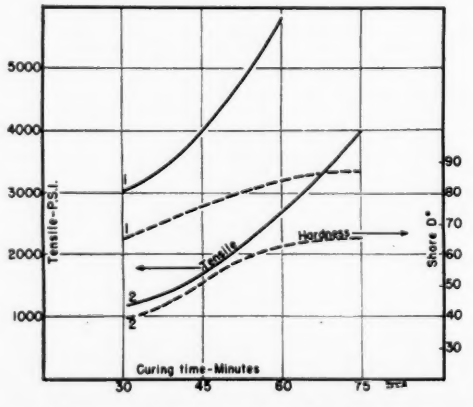

Fig. 7. Effect of Marbon "8000" in Hard Rubber Stocks

A Review of the Whipped Foam Rubber Process and Development of the Industry

G. H. McFadden[2]

Fig. 1. Batch-Type Forming Operation

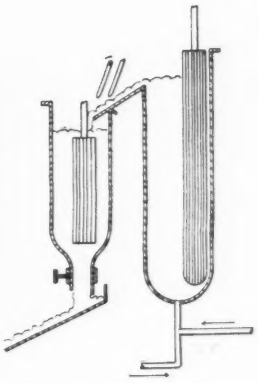

Fig. 2. Early Beater Device for Continuously Foaming Latex

FOAM rubber is considerably different from either chemically blown sponge rubber or expanded rubber. Expanded rubber is a uni-cellular (closed cell structure) material made from slab rubber, expanded either by external gassing or by incorporating certain gas-forming ingredients in the compound and curing under relatively high pressures. Chemically blown sponge rubber is made from slab rubber which is compounded with a blowing agent, and the resulting compound is baked like a cake. Upon heating of the material, the blowing agent decomposes to form a gas which causes the dough to "rise" or expand to fill a mold of the desired shape and size; the extra gas is permitted to escape so that the cells break as the rubber cures in its expanded state, leaving a product which has interconnected cells. Schidrowitz and Goldsbrough (1)[3] were the first to propose the manufacture of sponge rubber directly from natural latex. They added a blowing agent and a vulcanizing material to the latex and caused coagulation to take place in a manner which produced a spongy coagulum. The pores were fixed by vulcanization.

Foam rubber is a material which has interconnecting cells, but otherwise has physical characteristics quite different from those of chemically blown sponge. These differences are primarily due to the processsing methods used in its manufacture. Two general methods are in industrial use today. These are (a) the hydrogen peroxide frothing process (2), and (b) the whipping process, to which this paper is primarily directed. In both cases the foam rubber or latex foam is prepared from the milky latex of the rubber tree or from synthetic latices which have been compounded with the desired vulcanizing ingredients and a gelling agent. The froth is permitted to gel or "set" in a mold. The solidified gel is then cured in an oven; next it is washed and dried to give the product known as foamed latex sponge rubber.

Development of the Whipped Foam Rubber Process

Basically, the whipped foam rubber process, which was first described in 1927, is the invention of F. H. Untiedt (3). The invention provided that "ordinary rubber latex containing about thirty per cent of rubber can be converted into a foam by passing air into the latex and agitating. The process is much like beating an egg or whipping cream, and the resulting foam is stiff and stable." Soap, saponin, gelatin, glue, and/or other substances were added to assist in stabilizing the foam. The foaming step was accomplished in a vessel having a perforated plate disposed slightly above the bottom. Air was introduced beneath the plate and was allowed to rise through the layer of latex to form a froth. Agitation with a beater subdivided the bubbles until the mix had a creamy appearance. The foam was then spread out into sheets and allowed to dry to yield a porous rubber product.

In 1928, Chapman and Pounder (4) studied the heat-sensitizing and gelling of aqueous dispersions of rubber. They announced that emulsions or dispersions of rubber which are not "heat-sensitive" may be made sensitive to heat by the addition of certain substances which decompose or interact with rise in temperature, to cause the formation of one or more acid coagulants; for example, ammonium persulfate either with or without trioxymethylene. They also described the addition of gelling agents such as the alkali fluosilicates which, in sufficient quantity, bring about fairly rapid gelation in the cold, and in smaller quantities become very active gelling agents upon the application of heat.

The information gained from these studies led Chapman, Pounder, and Murphy (5) to apply the idea to foamed latex. They described this invention as a "method of manufacturing cellular goods . . . from emulsions or dispersions of rubber . . . which are capable of being formed into a froth," which, after the addition of various compounding ingredients, including a gelling agent, sets to an irreversible gel. The gel is then dried or vulcanized in steam or hot water. This patent proved to be the practical invention in the whipped foam rubber process.

Many improvements have been made on this process during the past 15 years. Some understanding of the trend in processing foamed latex may best be obtained by a brief survey of each of the major steps involved.

To date much of the foam sponge produced has been manufactured from natural latex and mixtures of natural and GR-S latices. Natural latex, whatever its concentration, is generally preserved by the addition of about 0.6% of ammonia. This ammonia content must be materially reduced in order to permit the preparation of a satisfactory foam product. Schott, Luxenberger, and Blair (6) describe a method for reducing the ammonia content in which the latex, confined in a large horizontal storage tank, is gently agitated by a series of propeller-type paddles. The temperature is kept constant at about 75° F., and steam-saturated air is blown across the upper surface of the agitated latex to remove the ammonia.

Various devices have been described which are capable of forming a satisfactory foam. The most familiar of these is the cake-mixer type. This consists of a cake

[1] Based on a paper presented at the Second Annual Polymer Symposium, Columbus Section, A. C. S., May 22, 1948, as a joint contribution of the Inland Mfg. Division, General Motors Corp., and the Ohio State University Research Foundation.

[2] Department of Agricultural Biochemistry, Ohio State University, Columbus, O.

[3] Numbers in parentheses refer to Bibliography items at end of article.

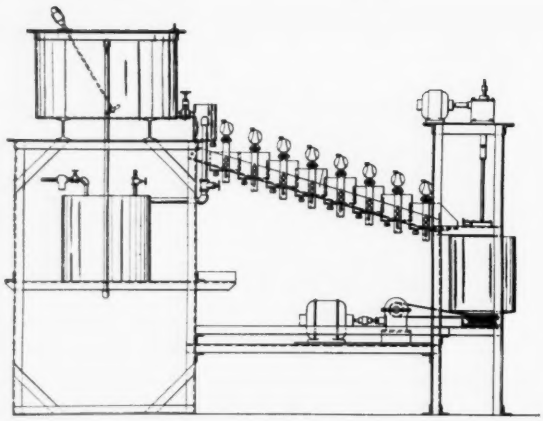

Fig. 3. Contiguous Compartment Apparatus for Continuously Foaming Latex

beater which both rotates and revolves within a bowl. It is principally used in batch operations (Figure 1). Some large companies use mixers of this type with bowls having a capacity of 200 quarts.

Extensive developments have been made in continuous foaming methods and apparatus. The first device of this kind(7) was described in 1936. It combines the feeding of liquid latex and a stream of air simultaneously into the bottom of a bowl (Figure 2). A cage beater whips this admixture into a froth which flows from the top of the bowl down a chute to a second bowl. As the material passes downward over the chute, suspensions and emulsions of required compounding ingredients are fed into the froth automatically. The material is then thoroughly mixed in the second bowl with a "sun and planet" type of beater until it forms a smooth foam of the required density. The material is drawn continuously from the bottom of this bowl.

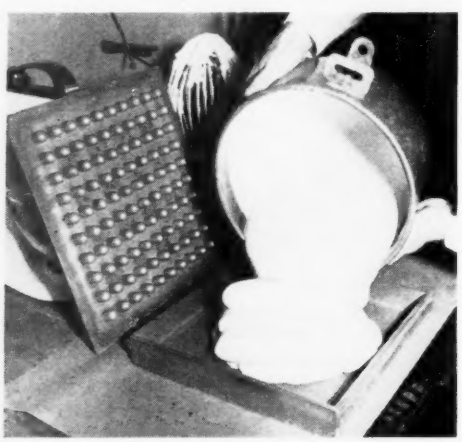

Fig. 5. Pouring Foamed Latex into Mold

Keen(8) improved this method and apparatus by adding prevulcanized latex through the bottom of a vessel and introducing air through a large number of minute perforations. The froth passes upward through a cylindrical shearing device where it overflows from a lip in the top of the vessel. The entire vessel is provided with a means for constant temperature control. The product delivered from this apparatus is known as a "prefrothed" latex. Clark(9) describes a mixing and whipping apparatus for processing the prefrothed foam, during which process destabilizing or sensitizing ingredients are mixed into the prefrothed material. Air from the atmosphere is beaten into the latex composition, and whipping is continued until the bubbles are reduced to substantially equal size, and the foam reaches a desired density. The latter operation is carried out under controlled conditions of temperature and humidity.

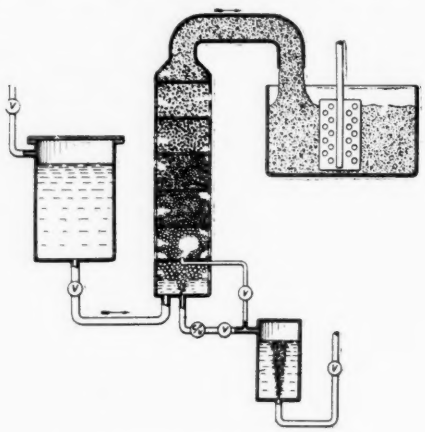

Fig. 4. Bubble-Forming Apparatus for Continuously Foaming Latex

Greenup and Johnson(10) approached the problem from a different point of view. They used a series of contiguous open compartments (Figure 3) arranged in a descending series, with a beater partially submerged in each compartment. The compartments are separated by notched partitions which permit the froth to pass from each into the next and somewhat lower compartment. Each receptacle provides a progressively increasing depth of froth toward the lowermost end of the apparatus. The foam descends past the series of beaters by gravity flow. Suspensions of compounding ingredients may be added at any desired point in the descending series of receptacles.

TeGrotenhuis(11) suggested a process for the continuous production of foam by introducing latex and humid air simultaneously into the base of a container fitted with a series of horizontal baffle plates (Figure 8); each plate has orifices that are progressively smaller toward the top of the container. The foam is forced upward by the pressure of the incoming latex and air and becomes progressively finer as it approaches the top of the container. Here it flows into a vat; compounding materials are added, and the foam is further whipped into the desired texture and density.

Recently a method of foaming latex(12) has been

Fig. 6. Placing Lid on Mold

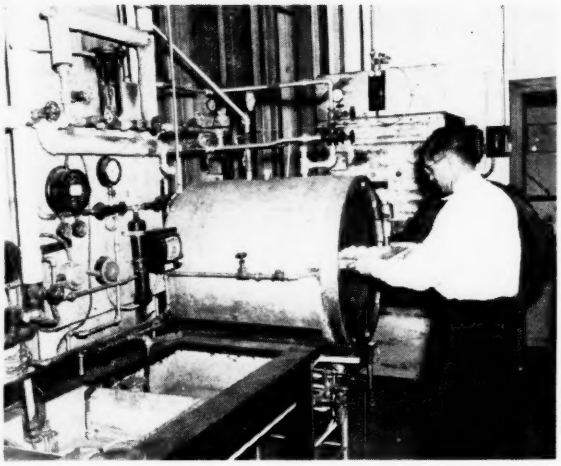

Fig. 7. Autoclave and Accessory Equipment for Vulcanizing Foamed Latex

described in which the physical characteristics of the foam are controlled by progressively beating the latex in a series of stages "wherein the latex is beaten at a progressively increased speed at each successive stage in a ratio of from 1 to 4 in the extreme stage wherein the top speed is in the neighborhood of 400 R.P.M."

Gelation of Latex Compound

All modern production of foam sponge includes a gelation step. A gelling agent is added to the foam at some time in the later stages of the foaming step. This agent must be of such a nature that the foam remains pourable and/or moldable and does not gel until after these operations are completed. The foam then gels irreversibly into a rigid structure that holds any shape in which the foam exists and at the same time permits the bubbles to become more or less completely intercommunicable to form a very porous structure.

Several agents have been used for the purpose of bringing about gelation; the most popular and most successful of these is sodium fluosilicate. The fluosilicates (4) are agents which gel in the cold. Their ability to gel latices is apparently due, at least in part, to their

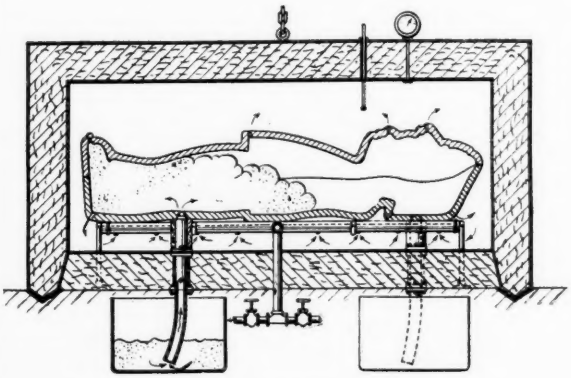

Fig. 9. Vacuum Filling Mold in Vulcanizing Chamber

hydrolysis in aqueous solution to form hydrofluoric acid at a definite rate. This in turn produces the type of coagulum known as a gel. The speed of the gelation is greatly affected by heat and also by the presence of zinc oxide (13). Two recent patents (14) make use of the alkali fluotitanates and alkali fluozirconates as gelling agents for foamed latex. These agents behave in a manner quite similar to that of the alkali fluosilicates. Another agent which has been used in latex foam gelation is ammonium persulfate in the presence of trioxymethylene (4). Ward and Purkis (15) accomplished satisfactory heat gelation of foamed latex through the use of aqueous solutions of the ammonium salts of strong acids, such as ammonium sulfate, ammonium nitrate and ammonium acetate, conditioned to have a pH value greater than 7, and in the presence of the oxide of a metal of fixed bivalency of Group II of the periodic system.

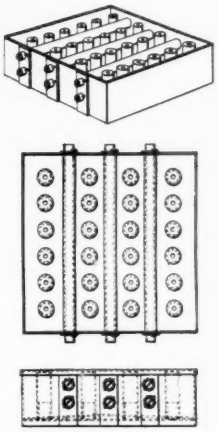

Fig. 8. Early Mold with Removable Parallel Tubes

Fig. 11. Stripping Vulcanized Piece from Mold

Carter (16) accomplished gelation of foamed latex through the use of ammonium nitrate and heat in the presence of baking powder and also with the same agent in the presence of sodium alum, calcium acid phosphate and a blowing agent (17). Ogilby (18) described a process for gelling foamed latex by reducing the temperature of the foamed composition to within the range of —60 to —18° C., whereby the foam is coagulated irreversibly. In the Talalay (19) process also the foam is frozen, but only to a temperature condition such that a stereoreticulate structure is formed, after which an irreversible gelling is accomplished by flushing the "ice-foam" with a coagulating fluid.

Molding

In the molding step the sensitized foamed latex containing the gelling agent is poured into a mold (Figure 5), and usually the mold is closed with a lid (Figure 6) before the gelation occurs. After closure, the gelation occurs, and the article is wet vulcanized (Figure 7) in the mold to form an article having permanently the shape of the mold.

In order to effect rapid and uniform heating through-

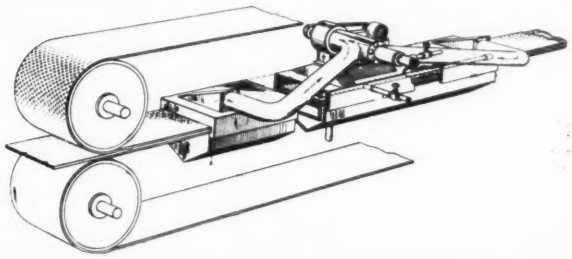

Fig. 10. Apparatus for Continuously Vulcanizing Latex Foam Sponge Rubber Sheets

out thick and irregularly shaped articles, Trobridge and others (20) provided a mold having loose-fitting, removable, closely spaced parallel tubes passing through the walls of the mold (Figure 8). These tubes were capable of conveying the heating fluid into the interior of the mass held within the mold. Reising (21) and Blair and Schott (22) improved on this idea by providing a lid with a number of projecting mandrels or fingers which reach through the foam nearly to the bottom of the mold. Cunningham (23) and others have added numerous improvements, such as mandrels which are insertable through lid openings, offset mandrels from both the lid and bottom parts of the mold, and the shaping mold. To facilitate the filling and molding operation for special articles, Talalay (24) suggested the use of a floating vent valve, and Carter (25) proposed filling a mold in an enclosed vulcanizing chamber by drawing the foam into the mold through the use of a vacuum (Figure 9).

Vulcanization

Madge, Round, and Norcross (26) proposed curing gelled foam sheet by transporting it on a traveling endless belt through a vulcanizing chamber (Figure 10) in a heated atmosphere containing water vapor. Novotny and Bosomworth (27) proposed curing a continuous sheet of foam by drawing it slowly through a hot water bath.

After vulcanization is completed the articles are stripped (Figure 11) from the mold and washed to remove foam stabilizers and other water-soluble ingredients. The article is then dried in an oven, after which it is inspected, repaired, if necessary, and packed for shipping.

Dufour and Leduc (28) in 1935 described a method of vulcanizing a mass of rubber between spaced metallic electrodes by heating them with an alternating current having a frequency of approximately one million cycles a second. As early as 1936, Murphy and Trobridge (29) had described the coagulation or solidification of heat-sensitized latex by means of a high-frequency alternating electric current. Recently considerable work has been done on the application of high-frequency heating to methods of gelling, vulcanizing, and drying latex foam sponge.

It is readily seen that a great deal of work has been done in the field of processing of foam latex. Much of the know-how is an empirical art. Colloidal chemists have neglected the study of the chemistry related to foam latex phenomena. Madge (30) has pointed out the need of fundamental information on the colloidal chemistry of the foam latex phenomena. Among the particular topics which Madge says need to be studied are "reasons underlying the type and fineness of structure caused by different foaming and gelling agents; factors affecting the collapse of the froth on gelling and the collapse of a set foam on heating; conditions governing gel coalescence, gas evolution and gel syneresis; and the influence of the majority of the foregoing on the size of the product after drying and on its tear strength and hardness." Many improvements are needed also in the manufacturing process. There is need of extensive work on development of physical tests and methods of measurement when applied to foam latex sponge. Above all else is the need of a good synthetic latex which will have all the qualities required for making good foam sponge and at the same time have the characteristics necessary for good control of the manufacturing process.

Development of the Foam Latex Industry

In the April 11, 1945, issue of the *Wall Street Journal*, Saada (31) made the following statement, "The rubber industry is preparing to turn an almost century-old discovery into a two-hundred million dollars a year retail business after the war."

He was referring to the sponge rubber industry and its future possibilities.

The first commercial foam rubber appeared in England in 1935. The first foam rubber used for automotive seat cushions appeared in buses in England in 1936. It was reported in June, 1949 (32), that most of these seat fillings are still in perfect condition, and also that mattresses made in the same year have been used continuously in a hospital in Ecuador and are still in good condition. These examples serve to illustrate the longevity of foam rubber under hard usage.

In 1945 six major American rubber companies were engaged in the manufacture of foam rubber. These six companies are today the major producers of whipped foam latex rubber. Several smaller companies are also in production of this type of foam rubber. Two other companies, Sponge Rubber Products and Dayton Rubber Co., recently entered the foam rubber field, but both are using the peroxide decomposition process (2) instead of the whipping process.

The six major companies mentioned above include Dunlop and Hewitt-Robins, at Buffalo, N. Y.; Firestone at Fall River, Mass.; Goodrich and Goodyear, at Akron, O.; and U. S. Rubber at Mishawaka, Ind. In 1947 the combined capacity of the latex foam manufacturers, working at full production, was 25,000 tons. About 15,000 tons were actually produced.

Extensive expansions of plant facilities have occurred since 1947. Hewitt-Robins has doubled production capacity at a cost of $850,000. Firestone doubled the plant capacity in 1948 and recently again increased facilities by the investment of $750,000 in building and equipment. Full production capacity will employ about 4,000 people. U. S. Rubber has greatly increased production facilities and Goodyear, in 1948, built a plant representing an outlay of some $5,000,000. This plant has four parallel production units and is claimed to be the world's largest continuous production line for foamed rubber. Thus the total present production facilities of all companies have been more than trebled since 1947.

The present retail price of foam sponge is, on the average, about $1 a pound, as compared to about half that price before the war. Foam rubber is primarily rubber latex and air. The price of rubber latex is therefore a major factor in determining the price of the finished foam product. In the last quarter of 1939 natural latex was quoted at from 19 to 20¢ a pound; in 1947 the price was 34¢ a pound, and the present price is 24.5¢ a pound of dry solids. GR-S latices for foam sponge are priced at 18.5 to 20¢ a pound of dry solids, and neoprene latex is currently priced at 32¢ a pound of solids. Standard mattresses are currently priced at $69.50 and $79.50, as compared to a price of about $100 a year ago.

The major portion of foam sponge is today being utilized as seat cushions and seat toppers in automobiles, buses, trains, planes, etc. These cushions, for the most part, are being manufactured from 70 parts natural latex and 30 parts GR-S latex. Other uses include mattresses and pillows, made from natural latex principally because the odor of this material is more readily masked; fireproof foam rubber, manufactured from neoprene latex; furniture and theater seat upholstery; and small articles such as bra pads, shoulder pads, powder puffs, packing material, etc.

A market survey report (33) on latex foam was completed in December, 1947. An intensive national advertising campaign has been carried on since that time. Window displays and local advertising have also been

used effectively. Goodyear further promoted sales by the use of a traveling salesroom and workshop which toured the country teaching the art of applying foam latex upholstery to furniture and advocating the use of such upholstery.

In addition to the uses enumerated above, foamed latex is finding application in many other fields. In a process for manufacturing a carpet underlay (34), foam latex scrap is disintegrated into fine pieces by means of a shearing impact apparatus. The particles are bonded together with latex and molded or sprayed on a hessian backing, dried, compressed, and cured. Another process derived directly from the foam latex process is the production of high tear sheeting (35). In this process the foamed latex is applied to a backing surface, the froth is permitted to gel and is then compacted by pressure until the cells collapse, thus forming a nonporous sheet. The sheet is then washed in stages, dried continuously, and cured intermittently. The material has a high tear resistance and can be sewed readily. It has been used for such purposes as parachute linings, protective clothing, self-sealing coverings for fuel tanks on military vehicles, and various other uses.

It is to be expected that in the future many other processes and products growing out of the foam latex industry or inspired by the foam latex process will find their places in providing new and useful materials for our ever-increasing use of rubber goods. Although the foam rubber industry is still an infant, it is rapidly growing into a strong and healthy adult.

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Marbon "8000"

(*Continued from page* 418)

section, and their ability to maintain physical properties with less sulfur content reduces the danger of sulfur bloom and scorch. Considerable savings in press time can be made through use of this resin in hard rubber compounds.

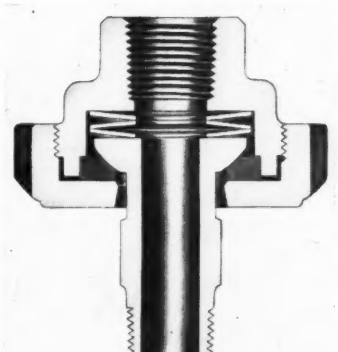
Golf ball cover stocks made from combinations of balata and Marbon "8000" have excellent cut resistance and adhesion to the latex thread, along with good rebound. Electrical wire insulation stocks are improved in tubing, abrasion, and electrical properties by use of the resin. Hard-board compounds containing the resin can be made to a wide range of stiffness, hardness, and impact strength values. Inexpensive rigid molding compounds are readily formulated with Marbon "8000" for making miscellaneous thermoplastic molded goods.

Other products wherein Marbon "8000" has found useful application follow: industrial hand-truck wheels; roller skate wheels; motorcycle and bicycle seats; bib washers; special sponge applications; table and desk tops; miscellaneous molded automotive parts; vacuum cleaner heads; footwear; garter buttons; garden hose; rubber bumpers; casters; appliance plugs and electrical outlets; deep freeze gaskets; steering wheels; cutting blocks; football and crash helmets; breaker strips; white hard rubber toilet seats; ski pole rings; television screen frames; and conveyer belts.

Summary and Conclusions

The specific properties offered to compounders by the use of easy processing Marbon "8000" resin are as follows: (1) uniform friable particles and lower fluxing temperature of the resin make possible easier incorporation and dispersion in the rubber mix; (2) the resin greatly aids processing in both mixing and molding because of its heat plasticizing action; (3) higher unit reinforcement can be expected, since higher hardness, greater stiffness, lower compression set, and better tear and flex-crack resistance are quite evident in the finished product; (4) the resin offers a wide range of color possibilities, good light and heat aging qualities, and good dielectric properties with low moisture absorption; and (5) the versatility of the resin has been demonstrated with practically all of the natural and synthetic rubbers.

Swivel Pipe Joint



Cutaway View of New Barco Rotary Swivel Pipe Joint

A NEW rotary swivel pipe joint for swivel and slow revolving applications has been announced by Barco Mfg. Co., Dept. 54, 1801 W. Winnemac Ave., Chicago 40, Ill. The design of the joint eliminates wedge action of the ball against the gasket, thus almost completely eliminating turning torque. The ball is held in place by a Belleville spring. The new product is also said to be unique among swivel and revolving joints in that a small amount of side flexibility reduces the possibility of wear or breakage from side strain.

The new joint performs without leakage at extreme temperatures, and extra-heavy models are available for extreme pressures and vacuums. Successful performance has been obtained at continuous rotation up to 30 r.p.m., and the joint will handle practically all fluids and gases including corrosive acids and alkalies. Simplicity of design permits low initial cost and freedom from maintenance. The new joint is presently available in 90-degree angle and straight types in pipe sizes ranging from ⅜- to one inch.

EDITORIALS

"The Fighting Fifties"?

AMONG the many terms that have been used recently to attempt to predict the character of the period that has just begun with the year 1950, there is one, "The Fighting Fifties," which may turn out to be particularly appropriate without implying the need of any fighting in the military sense. We in the United States and in many other parts of the world will have much to fight for in the next decade as a result of the happenings of the last decade, which included World War II, an increase in our national debt to more than 250 billion dollars, and the advent of atomic energy.

In the United States one of the most important problems in the 1950's is the stabilization of our domestic economy at or near its present level, now that most of the accumulated postwar demands for goods and services have been satisfied, and, at the same time, the task of relief of wartorn areas abroad has also been largely accomplished.

Most of us will agree that since the end of World War II, the economy of the United States and the economies of those nations of the world not enveloped by the Iron Curtain are more dependent on each other than ever before, but we must also face the fact that our trade with these countries has been made possible mostly by funds secured by taxation by our national government.

The American Tariff League at its annual meeting in New York, N. Y., on October 26, 1949, held a panel discussion on the subject, "Facing the Foreign Trade Gap." Fred G. Singer, chairman of this meeting, included the following in his comment on international trade:

"I think you all know that the gap we are referring to is the difference between our exports and our imports. There is never any gap in balance of payments. That is always balanced. But the important question there is how? Today it is chiefly settled by yourselves through taxation by our national government."

Another speaker, John Lee Coulter, consulting economist, in presenting his views on our foreign trade and its relation to our own domestic economy said:

"The question must necessarily present itself whether the United States will continue to tax American citizens in order to raise funds to send machinery, automobiles and other vehicles to European or other foreign countries on such scale as to that which has prevailed during the last two years, especially since this extraordinary process of financing and exporting machinery, automobiles and other vehicles has undoubtedly at the same time been responsible for not only maintaining but substantially increasing the price level of these commodities in the American market, thus increasing the cost of living of the entire American population."

It is hoped that the review by Congress in 1950 of taxation policies of the Federal Government will result in some reduction of corporation, excise, and personal income tax rates. Actually, however, it is up to those who want tax reductions to fight for them.

The tire and tube branch of the rubber industry will fight vigorously to have the excise tax on its products removed or reduced substantially. This tax, by reason of wartime increases, now ranges from 7% to 14% on automobile tires and tubes up to 26% to 35% on various types of lawn-mower tires and semi-pneumatic tires for toys.

The tire and tube excise tax bill for all users of tires and tubes has amounted to more than $1,143,000,000, since 1932, as compared with the excise tax on all other automotive parts for the same period of $646,570,000.

The tire and tube manufacturing industry is basing its appeal to Congress for the correction of this inequity on the fact that as integral parts of automobiles, trucks, tractors, etc., tires and tubes should not bear a disproportionately heavier share of the tax load than do the vehicles themselves or other parts and accessories for them, and on the removal of tires and tubes from the antiquated and obsolete "luxury" tax classification.

The need of aggressive action by the rubber industry in connection with the formulation during 1950 of a long-term national rubber policy based on our American synthetic rubber plants, an adequate natural rubber stockpile, centralized control of the government's activities in rubber, and plans for a continuing program of fundamental research on rubber, was discussed in this column last month and need not again be repeated here.

Finally, as pointed out by J. Ward Keener, vice president in charge of employe relations for The B. F. Goodrich Co., in a talk before the New York State School of Industrial Relations on December 15, if a company is to assume leadership in the "competitive Fifties," as he terms the next decade, it must reduce costs and increase efficiency through the cooperation of its working forces.

"Labor and management stand to make consistent gains if they cooperate in active programs and methods designed to improve the business. Failure to follow this objective will not only injure investors and management of business, but will limit or remove the security of the employes and the unions which represent them," Mr. Keener said.

He also warned against relying upon lawmakers to "lay down a pattern which can solve the problems of the modern industrial system. It is also necessary for labor and management to tackle their problems at the common-sense level—in the plants—where they develop."

The outlook for the period of the 1950's, therefore, seems to call for aggressive action by business and the public to correct excesses in governmental taxation, spending, and labor policies in order that we may build a stable national and international economy based on fundamentals instead of expediency.

DEPARTMENT OF
PLASTICS TECHNOLOGY

Some Notes on the Injection Molding of Polystyrene—I[1]

Grant W. Cheney[2]

INDUSTRIALLY speaking, polystyrene is a relatively new material. Its development as a molding material during the last ten years has taken place at an almost phenomenal rate. Only since the war has a majority of the molders had an opportunity to investigate polystyrene thoroughly. Their rapid acceptance of it is responsible, to a great extent, for its phenomenal growth.

In the United States during 1944 polystyrene accounted for approximately 4% of the total thermoplastic production, increasing to approximately 28% of the production in 1948. During the same period the total thermoplastic production increased by approximately 100%. Thus it is seen that during this four-year period a fourteen-fold increase in polystyrene production occurred.

During this same period progress in molding increasingly larger and more complex parts on faster cycles has taken place at a comparable rate. More and more severe service conditions have been imposed upon polystyrene parts, and the circle of application and performance continues to grow. In some cases the material has stood the test of use even though many predictions were to the contrary.

Almost every day the plastics molding industry is being called upon to produce injection molded parts of increasingly greater complexity with better control of dimensional accuracy, better finish, and better physical properties. These things are all being obtained with constantly decreasing costs. Recent improvements in the field of injection mold design and operation have contributed significantly to this progress. Other contributions have come from plastic material manufacturers, machinery builders, and end-users of plastics.

Although progress in polystyrene molding has been both excellent and rapid, it has not come about easily. Many costly failures have occurred, and the lessons to be learned from such failures have not been applied completely on subsequent applications. Possibly this situation exists because a condition may take many forms and variations and consequently is not always recognized immediately. It is understandable and excusable that the complexities involved in injection molding may cause confusion at times. During the molding cycle the material exists in both a solid state and a comparatively fluid state, with varying intermediate degrees of fluidity, or viscosity. Because of this condition the laws of hydraulics, or fluid flow, more usually applied to fluids of comparatively constant viscosity, become very difficult to apply with any degree of mathematical accuracy. Because such well-known engineering principles are so difficult to apply, the tendency to ignore them in favor of trial and error methods of approach is very great. These laws however, do apply reasonably well, if properly interpreted, and possibly some discussion of their application in specific cases will be helpful in stimulating further thought in what is hoped will be the right direction.

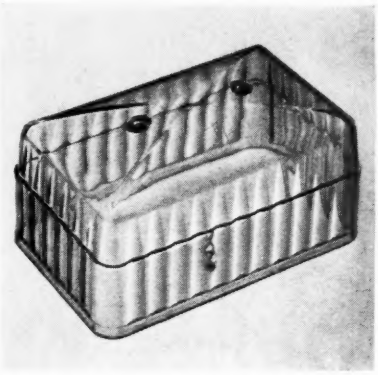


Fig. 1. Molded Butter Dish Showing Trapped Air Bubbles in Cover Dome

Actually many variables should be discussed. This discussion however, has been limited to consideration of five of the more important factors: namely, (1) control of plastic flow in the cavity; (2) mold temperature control; (3) sticking of parts in the mold; (4) restricted gating; (5) gate balance. Each of these topics is sufficiently broad to justify a complete chapter of its own. But they are all very much interdependent and therefore cannot be completely separated in any discussion.

Control of Plastic Flow in the Cavity

Control of flow in the cavity is difficult partly because serious limitations are often imposed by the design of the part itself, partly because too little knowledge is available to the designer, and partly because the artist's conception of desirable appearance may result in unreasonable complexities. Air traps, weld lines, and sink marks may be controlled to a considerable extent by proper arrangement of flow within the cavity.

Control of plastic flow in the cavity is largely a matter of having the correct section thickness so arranged with respect to the gate that the plastic reaches all areas of the mold at the proper time. Further analysis of the nature of the flow of molten plastic may help illustrate this point.

For example, assume that a relatively non-viscous liquid under constant pressure is supplied from a common source to two passageways of somewhat different sizes. To be more specific, assume that passageways of equal length, 1/16- by ½-inch and ⅛- by ½-inch in cross-section, are connected to a tube containing water under pressure. Neglecting frictional losses, the rate of flow in the passageways is proportional to the cross-sectional area, and the velocity is the same in each. If we consider frictional losses, the ratio of surface to cross-sectional area is larger in the smaller passageway, its resistance to flow and frictional losses is somewhat greater, and its flow velocity somewhat less. If a more highly viscous material, such as oil, with a viscosity in the range of 100 to 500 cps., is substituted for the water, the resistance to flow in both channels increases, but the increase is relatively greater in the smaller channel. Therefore, as the viscosity of the fluid increases, the velocity in both passageways decreases, but the relative velocity decrease is greater in the smaller passageway. If molten plastic, with a viscosity of approximately 50,000 poises, is then substituted for the oil in the system, the condition is aggravated. The relative reduction in velocity in the smaller passageway is great because of the very high viscosity. In addition, if no external heat is applied, cooling occurs more rapidly, thus further accelerating the increase in viscosity and flow resistance.

Therefore it is evident that several factors act to decrease the rate of flow in the smaller passageway. It is entirely possible that the combination of these factors can cause all flow to stop in the smaller channel, at least until more pressure is applied. If flow in the larger channel is stopped, sufficient pressure may be built up to cause flow to resume in the smaller channel.

Variations in section thickness of a molded part actually constitute passageways of varying sizes within a single cavity. Even small variations may be sufficient to slow up or stop flow in one area while allowing it to continue in another. Very often air traps and weak welds occur because of the manner in which variations in passageway size affect flow within the cavity. One way to determine how the plastic flows in the cavity is by making a series of short shots or partial moldings. It is a rather simple matter to use information obtained from a short shot to correct the flow pattern. It is recommended first, however, to establish that no possible combination of molding conditions can be set up to eliminate the difficulties brought about by improper flow conditions, before alterations are made on the mold. Of course it is better to avoid such difficulties when designing the mold. Perhaps the following illustrations will be useful in this regard.

Figure 1 shows the difficulty encountered in molding a butter dish cover. In this case two large bubbles of trapped air appeared near the top of the cover, the last point to fill in the mold. No amount of variation in molding technique could avoid this condition. In order to continue the use of the edge gate, adjustments in section thickness had to be made. The

[1] Presented before Society of the Plastics Industry (Canada), Inc., Royal York Hotel, Toronto, Ont., Canada, June 14, 1949.

[2] Dow Chemical Co., Midland, Mich.

Fig. 2. Camera Panel Moldings (*Right*) with Short Shot (*Left*) Made to Determine Plastic Flow

possibilities were either to increase resistance to flow around the periphery of the cover, or to decrease the resistance to flow over the top of the dome. It was recommended that the force of the mold be ground off by about 0.010-inch to increase the dome thickness. It may still be necessary to add decorative bands to speed the flow over the top. On a new mold for pieces of this shape the use of a pin point gate in the center of the dome would be strongly recommended. Even so, weld lines may occur near the corners and may not be entirely avoidable except on pieces of a spherical or cylindrical shape.

Another example of the study of flow in the mold cavity is shown in Figure 2. The mold is an eight-cavity mold and the full shot is shown at the right. Short shot studies were made to see how the part filled, and one of these shots is shown at the left. It can be seen readily that three air traps are formed due to the heavy flow channels. The two large traps made weak welds, which could not be improved enough by increased mold and plastic temperature, because these correcting factors caused sticking in the mold. A study of the short shots indicated clearly that some interference in the heavy sections was required to impede the flow through them. This condition could have been effected by adding small cored holes in the ribs to slow up the flow of plastic down these channels. The other possibility was to decrease the thickness of the ribs.

Control of sink marks by proper flow of the plastic within the mold is another remedy which has not been utilized fully as yet. Sink marks may be brought under control to a considerable extent by avoiding heavy sections, heavy ribs, bosses, and large fillets. Sometimes these bad features become a part of the product design for various reasons, and it may be necessary to work around them by means of flow control schemes. Increasing the plastic section thickness lightly at the proper places, as the plastic moves away from the gate, may be helpful, and usually this practice is more effective than gate and runner alterations.

Figure 3 illustrates another adverse condition which may result from variations in section thickness. The coat hanger section is approximately 5/8-inch deep and 1/4-inch thick at the top, tapering to approximately 1/16-inch thick at the bottom edge. These pieces were said to be excessively brittle, and much breakage

Fig. 3. Molded Coat Hanger Showing Brittleness Caused by Thickness Variations

occurred. The difficulty was a result of the differential rates of cooling caused by the large thickness variations. Close examination disclosed minute crazing along the thin edge to a depth of approximately 1/8-inch. Since crazing is a series of minute fractures, it was not surprising to find that, where breakage occurred, the fracture started along one of the craze lines. It is probable that in the molding process this thin edge cooled and solidified much more quickly than the thick edge. Subsequent cooling and shrinkage of the thick edge caused a sufficient amount of bending in the already hardened thin edge to introduce tensile stresses of sufficient magnitude to cause crazing. Therefore the material was condemned as being brittle. The remedy, though, was to increase the thickness of the thin edge so as to equalize shrinkage along both edges.

From the discussion thus far, it might be concluded that variations in section thickness are not to be tolerated. Such is not the case. It is recognized that such variations are necessary in some designs. They should be avoided if possible. However, if they become necessary, adequate knowledge and forethought usually can bring about an arrangement of such variations in a manner which will assist rather than impede the molding process.

Mold Temperature Control

Mold temperature control is a useful and valuable tool for the injection molder. Adequate temperature control means that the entire surface of the mold cavity must be maintained at the proper temperature. For best results on critical applications, temperature variations should not be more than 5° or 10° F. from the optimum.

In general, plastic flow within the cavity is usually improved by higher mold temperatures than those commonly used by many molders. For polystyrene, relatively high mold temperatures, in the range of 150 to 190° F. usually assist in making stronger bonds or welds, allow the use of lower plastic temperatures, minimize the occurrence of silver streaks or splay marks, and improve the temperature and craze resistance of the molded part. Many qualifications should be made in this connection, but will be omitted in order to allow the thread of thought to continue toward an outline of what to do about building the mold so its temperature can be controlled properly.

In the first place it is desirable to have the two halves of the mold at separately controllable temperatures. In most cases it is necessary that these two temperatures be not widely different in order to avoid cooling strains. Also, it is usually best to have the surface of each mold half at a uniform temperature all over. This requirement means a large volume of heat exchange fluid passing through the mold so that a minimum temperature differential exists between incoming and outgoing fluid. Uniform temperature of the mold surface also requires, if possible, location of the channels in the block of steel which is to have its temperature controlled, not in a plate behind it. "If possible" means making the cavity or core block large enough to accommodate the channels, arranging the ejector pins so that adequate, properly located channels are obtainable, and designing the channels in the blocks before figuring how they fit into the retainer plates. In some cases this recommendation will mean the use of special, rather than standard, mold bases, but they may be very well justified.

The heat exchange channels should be large, at least 9/16- to 11/16-inch in diameter. This provides a large area for heat transfer and prevents throttling of flow or stoppage of channels by corrosion.

It is not adequate mold temperature control practice to attach the cooling channels of the mold to a manually adjusted trickle of water from a city water main, artesian well, or a refrigerating system. A small flow of relatively cold water causes a considerable temperature variation throughout the length of the cooling channels. Therefore uniformity of tem-

perature over the surface of the mold is not possible. The best designed mold in the world cannot overcome this difficulty. Good mold temperature control comes from having a large amount of heat exchange fluid at a temperature within 5° to 10° F. of the desired mold temperature. Mold temperature control equipment is available to provide heat exchange fluid which will produce this result. A considerable capital equipment cost is involved, but such investments have been found to be among the most rapidly amortized items of molding equipment. When good mold temperature control is added to some of the newer mold design techniques, increased production of salable moldings may be very great. In certain cases savings have been sufficient to recover a $1,500 equipment investment in a period of six weeks or less.

(To be continued)

SPE National Conference — Tentative Program

THE tentative program for the sixth annual National Technical Conference of the Society of Plastics Engineers, to be held at the Hotel Carter, Cleveland, O., on January 11-13, has been announced by Conference Chairman Richard L. Huber, Hercules Powder Co. Besides a full program of technical papers the conference will also feature luncheon and banquet meetings and an interesting schedule of events for the ladies.

The program announced thus far, together with available abstracts of papers to be presented, follows:

WEDNESDAY, JANUARY 11

10:00 a.m. Official opening of the conference.

"The Plastics Calender and Its Auxiliary Equipment." T. J. Kerr, Yardley Industries, Inc., Chicago, Ill.

Some of the ways in which the rubber calender could be improved for greater utility in plastics will be discussed. Rubber stocks processed on the calender retain considerable nerve, and the processing is done at low enough temperatures so that the stock has greater viscosity than plastic stocks. This procedure requires much horsepower; whereas the minimum viscosity, semi-molten, and molten state of plastics during processing requires less power. This condition suggests the possibility of designing entirely new equipment for plastics, using smaller rolls to form the sheet and avoiding the heavy construction of present calenders.

Almost all plastics manufacturers preblend film and sheeting stocks before Banbury mixing so that the function of the mixer becomes primarily that of a heat exchanger to convert the blended mixture into a plastic mass. This point immediately raises the question, "Is this massive machine the most practical and economical heat exchanger for the purpose?" Some of the problems involving auxiliary calender equipment, especially those used to produce decorative effects, will also be discussed. Much can be done to adapt the present embossing, printing, and coating machinery to the handling of unsupported film.

"Fluid Heating and High Temperature Cooling for Calenders and Presses." Paul L. Geiringer, American Hydrotherm Corp., New York, N. Y.

Increased production speeds and closer quality control have created a difficult problem in maintaining calender rolls and presses at uniform surface temperatures. Peak demands on the boiler and friction heat properties limit the speed of operation with steam. The Hydrotherm fluid heating system provides uniform temperatures for either heating or cooling over a very wide range. Fluids are available for any temperature from —20 to 700° F. The use of a fluid system permits heating, cooling, or alternate heating and cooling with a short cycle of operation and using one heat carrier. Installation can be made completely automatic with great economy in labor costs. This system provides for greatly reduced maintenance and eliminates the shock loads prevalent with steam operation.

"The Electrosol Process—A New Development in Elimination of Electrostatic Accumulations in Plastics." Merrill J. Ainsworth, consultant.

Static electricity has for years created serious difficulties in the plastics, textile, and paper industries. Problems involving static electricity and plastics generally may be considered in four categories: (1) handling and fabricating plastics materials; (2) affecting mechanical performance of the plastic part being manufactured; (3) appearance of the material in the finished part; and (4) hazard to materials, facilities, and personnel.

To be completely effective in elimination or control of static electricity in plastics, the means employed must prevent the accumulation of an electrostatic charge on the parts or materials involved; be relatively permanent in its effect; be impervious to varying conditions of temperature and humidity; be unaffected by normal handling and other processes; be of such nature that it does not damage the appearance of the part or material processed; be of such composition as to be inert in its effect on normal paints, lacquers, and enamels; be of such nature as to remain inert in effect on all plastic materials; be of such low cost as to permit ready use; and be a process or treatment that does not add hazards of its own.

Such a process, which has emerged from the laboratory and is finding ready applications in the plastics industry, will be commercially identified as the Electrosol Process and consists of a two-stage dip or spray application of two successive formulations. The process and its application will be discussed in some detail.

12:15 p.m. Luncheon meeting. Guest speaker: Gilbert Thiessen.

"Raw Materials for the Plastics Industry." Gilbert Thiessen, Koppers.

The plastics molding and fabricating industry is unique in that its raw materials are in themselves highly manufactured products. Any increase in supply of such materials depends on the growth of specialized industries which stand between them and the ultimate raw materials. Raw materials supplies for plastics are now in balance. Adequate supplies exist for the expansion of all types of plastics other than the benzenoid types. When installed, low-temperature coal carbonization and coal hydrogenation plants can furnish needed benzenoid raw materials as off-shoots of liquid fuel production. Such plans are still only long-range possibilities. Styrene made available by decreasing synthetic rubber manufacture has been absorbed by polystyrene manufacturers. The ingenuity of the synthetic organic chemical industry will assure adequate supplies of raw materials for the fast-growing plastics industry.

2:00 p.m. Afternoon session begins.

"Constructive Improvements in Design of Injection Molding Equipment from the Users' Standpoint." Elmer E. Mills, Elmer E. Mills Corp., Chicago, Ill.

The need of safer machines, both for personnel and molds, is emphasized. Machines should also be designed to stress economy of operation, as well as for economy of provided tooling. This could be accomplished by much more flexibility in operation than is available on present-day equipment. Certain changes could be made in equipment to simplify and reduce maintenance costs.

"Mold Designs." J. L. Morrison, Detroit Mold Engineering Co., Detroit, Mich.

"Recent Developments in the Compression Molding of Thermosetting Materials." D. S. Hiltebrant, General Industries, Inc., Elyria, O.

Recent developments in the compression molding of thermosetting materials can be listed under three distinct categories: (1) new materials formulations; (2) improved molding techniques; and (3) large-size moldings. In the first category were recently announced three new types of materials: the so-called "low pressure" materials designed for molding large pieces at reduced pressures; the fast curing phenolics which allow for much faster molding cycles by speeding the curing time; and the alkyd materials which are so fast curing as to require completely new molding methods.

Probably the most important of the new molding techniques are the plunger transfer process and the high-speed pressing required for the alkyds. The category on large-size moldings is self-explanatory and includes molding on large presses of from 1,000-2,000-ton capacities and molded parts weighing from 10-35 pounds. All these developments have resulted in a widening of the uses of thermosetting plastics, which should react favorably to the advancement of the industry.

"Injection Molding — Preplasticized Thermoplastic and Its Advantages." James W. Hendry, Jackson & Church Co., Saginaw, Mich.

The plastic industry needs machines which will not require tremendous pressures and injection and clamping to obtain large molded parts. We have designed a machine to do these things and also provide preplasticizing action. This preplasticizing permits a reduction in original cost of material since we can compound such materials as cellulose acetate, polyvinyl chloride, and ethyl cellulose. Another feature is that we can now color polystyrene, with a resultant saving in material cost. Preplasticizing also gives better moldings by allowing the use of lower pressures. By using lower pressures the strains in the part are reduced, as are the flexing and stretching of mold cavities, and strain-free parts of accurate dimensions can be obtained readily. Preplasticizing also permits faster molding cycles since, when the mold is ready to give up its shot, the next shot is ready to be injected into the cavity.

"Field Molding Problems and Their Solutions." C. J. Snyder, Koppers Co., Inc., Pittsburgh, Pa.

Field molding problems can be expected upon the introduction of new plastic products, new dies, and new raw materials. Rapid advances in plastic materials, methods, and molds in the past five years have

dispelled many of the fears of molders and manufacturers. The trend, however, is to larger and more complicated products, which create new and different molding problems. These problems are often more serious than any previously encountered because of the high initial investment in dies and machines and the higher labor and materials costs. This discussion will be restricted to injection molding of thermoplastics.

Molding problems can be expected not only when new dies are installed, but also when old dies are rerun or when new materials are used. Common troubles which arise are short or incomplete shots; rejected parts because of surface and interior marks; cracked or broken parts caused by sticking; and imperfections and cracks showing up after storage or service periods. These problems can be caused by improper molding conditions, poorly designed dies, use of molding materials other than those for which the dies were designed, use of scrap or rerun materials, using molding machines beyond their capacities, or use of molding machines in poor mechanical condition.

"Pin-Point Gating." W. P. Gobeille, Nash-Kelvinator Corp., Detroit.

THURSDAY, JANUARY 12

9:30 a.m. Morning session starts.

"Applications for Low Molecular Weight Polyethylene." Speaker from Bakelite Corp., New York, N. Y.

"Continuous Laminating of Reinforced Plastics." S. M. Cash, Continental Can Co., Cambridge, O.

This paper will describe reinforced plastics, what they are and how they are made, and point out how the laminating of plastics differs from the laminating of other materials. The laminating of paperboard, foil, and film requires simple gluing and drying; while with plastics the bond is effected by a complex chemical reaction. The paper will also include a discussion of the preparation of resins and fillers used in laminating, the mechanical equipment needed for laminating by the continuous process, controls needed for successful production, and the evaluation of the properties of finished laminates.

"Machinery for Plastics Coatings." A. J. Gaio, John Waldron Corp., New Brunswick, N. J.

Knowledge and experience acquired during the war in developing protective and decorative coatings have begun to bear results which few thought possible. Not only new materials, but modifications and improvements in old materials are increasing with such rapidity that it is impossible for any individual to keep thoroughly informed or to comprehend the total significance. The rapid advance has made more pronounced the problem of selecting the coating machine most suited to applying a particular type of coating.

This paper is designed to facilitate understanding of the four general types of coaters used for plastics: namely, the knife, roll, air, and cast coating methods. There are three types of knife coaters, including the floating, blanket, and rubber type spreaders; several types of roll coaters, including the doctor kiss, roll kiss, edgewise, and reverse roll types; two types of cast coating, including the casting drum and casting belt; plus the recently developed air knife method.

"Heating Units." T. F. Walsh, Sill Paper Co., New York.

"Electronic Heating Devices." Edward J. Wohlfarth, Mayflower Electronic Devices, Inc., West New York, N. J.

1:15 p.m. Annual business meeting.

3:00-5:00 p.m. Papers and speakers to be announced.

6:30 p.m. Cocktail hour.

7:30 p.m. Banquet and presentation of awards to Prize Paper Contest winners. After-dinner speaker: Howard E. Fritz, The B. F. Goodrich Co., Akron, O., on "Your Right to Think (A Sixth Sense)."

FRIDAY, JANUARY 13

10:00 a.m. Last session begins.

"Extrusion Equipment—Views of the Plastics Processors Regarding the Design of Presently Used Machines." M. S. Greenhalgh, General Electric Co., Schenectady, N. Y.

Since the advent of vinyls the extruding business has grown rapidly. We have progressed from the old rubber extruder to the extended, double extended, and multibarreled versions; from the old food chopper screw to the torpedo, constant pitch, and diminishing depth types prevalent today. At the same time improvements have been made on the plastics compounds themselves. Today we have faster and easier processing resins, and it is necessary to take full advantage of these resins for economic reasons. The technique of feeding the extruder in many cases has been changed from mill-fed to granulated, and finally to powder mixes. Pigments, lubricants, fillers, and plasticizers, together with the base resins or compounds, are being added directly to the extruder. In short, the extruder is being required to perform tasks which hitherto have been done in various types of mixing equipment.

Many questions, however, are still unanswered as to what is the proper and most efficient extruder design. It is felt by many that the equipment manufacturer has not kept abreast of the needs of the industry. This need not only covers the fundamental design of the extruder, such as type of screw, size, and external contour of head, size and shape of feed hole, centering set-up, type of breaker plate, heating and cooling facilities, etc., but also a design which would be more efficient from a manufacturing standpoint by simplifying the work of the factory operator.

"Double Screw Mixer." L. Street, Welding Engineers, Inc., Morristown, Pa.

The Compounder-Extruder, developed by Welding Engineers, has two worms lying side by side with the peripheries of the flights adjacent, and the machine is so designed as to give plastic materials a thorough compounding, plasticizing, and mixing action as they pass through. Equipment of this type has been used successfully on vinyl compounds, color dispersions in polystyrene, saran, nylon, plastic scrap reclamation, and other materials. Applications are suitable both for compounding and extruding, and for preparing material for the molder or custom compounder.

"Controversial Points on Extrusion." Hans E. Buecken, National Rubber Machinery Corp., Akron, O.

Ever since the first few plastics extruders have been in operation there have been controversial opinions regarding extruder design and operation. Today, with thousands of these machines in use and with growing competition among their manufacturers, these points have grown in importance. Some of the controversial points discussed in this paper are: screw types and materials; liner types and materials; types of cylinders; types of dies and die materials; condition of feeding compounds; types of preheating; cylinder temperatures; temperature controls; types of drives; and types of extruders.

Du Pont History Reviewed

The Philadelphia Section, SPE, held a regular dinner-meeting December 5 at the Penn Sheraton Hotel, Philadelphia, Pa., with some 59 members and guests attending. Feature of the meeting, which was also the Section's annual Ladies Night, was a talk on "The Du Pont Company's History, with a Personal Slant," by James Q. du Pont, E. I. du Pont de Nemours & Co., Inc.

The speaker's review of the company's history included many stories of the firm's leaders, taken from associations with members of the du Pont family. The company was founded in 1802 by Eleuthere Irenee du Pont who established a plant at Wilmington, Del., to manufacture gunpowder, a business he knew well. Despite many financial problems the company grew steadily and added the manufacture of dynamite, guncotton, and smokeless powder late in the 1800's. In 1902 the company was purchased by Alfred I. T. Coleman, and Pierre S. du Pont, who expanded and consolidated operations. The speaker also reviewed the company's diversification policy after World War I, the departmentalization effected in 1921, the effect of the depression of the early 1930's, and the problems of reconversion after World War II.

Twenty-seven door prizes were distributed at the close of the meeting, and ropes of pearls given to each of the 27 ladies present.

The following officers and directors of the Section were elected in a recent mail ballot: president, H. S. Stevenson, Electric Storage Battery Co.; vice president, G. W. Gaylor, American Viscose Corp.; secretary, D. I. Yarnall, Rohm & Haas Co.; treasurer, R. B. Bishop, Socony-Vacuum Oil Co.; national councillor, W. O. Bracken, Hercules Powder Co.; and directors in addition to the officers, A. D. Calabro, Calabro Plastics Co., H. J. Harp, Calco Machinery Co., G. H. Koch, Molded Insulation Co., and G. H. Mains, National Vulcanized Fibre Co.

The appointment of the following committees was also announced: credentials, Mr. Mains, chairman, J. C. Graf, John C. Graf Co., Mr. Calabro, and M. Sperber, Sperber Co.; membership, Mr. Koch, chairman, H. Clark, C. C. Davis, Stokes Trenton, Inc., B. C. Stone, Dow Chemical Co., C. S. Wetzel, Rohm & Haas, A. D. Olsen, Hercules Powder, and J. M. Waldecker, Michigan Molded Plastics Co.; publicity, J. King, chairman, and A. J. Lesbriel, Formica Co.; program, D. A. Hurst, Rohm & Haas, chairman, M. R. Stokes, Westinghouse Electric Corp., and R. C. Beshgetoor, RCA Victor Division; nominations and elections, Mr. Gaylor, chairman, and Mr. Calabro; prize paper, Mr. Calabro, chairman, and Mr. Sperber; and dinner, W. C. Wimmer, chairman, H. Harp, and W. H. Stagg, Plastics Engineering Co.

Discuss Pin Point Gating in Injection Molding

The November 25 meeting of the Cleveland-Akron Section, held at Bowen's Restaurant, Cleveland, O., featured a round-table discussion of pin point gating in injection molding. Some 43 members and guests heard the discussion by Frank E. Schneider, Inland Mfg. Division, General Motors Corp., Frank A. Martin, Hoover Co., and A. Reynolds Morse, Injection Molders Supply Co.

Using samples of molded parts, the speakers discussed what pin point gating will and will not do in the injection molding of vinyls, polystyrene, cellulose acetate, and methyl methacrylate. Some of the topics covered in the discussion included the size and shape of pin point gates; the effect of pin point gating on molding temperature, molding cycle, and physical properties of the molded part for each of the plastic types; and proper design of injection nozzle and mold for pin point gating.

Holds Symposium on Molding Problems, Etc.

A symposium on thermoplastic and thermosetting molding techniques, design, tooling problems, and trouble shooting featured the December 7 dinner-meeting of the Western New England Section at the Hotel Sheraton, Springfield, Mass. Prizes were awarded for questions used during the program, with additional prizes for stumping the experts. This panel of experts consisted of George Whitehead, Improved Paper Machinery Corp.; Dick Richardson, DeBell & Richardson, Inc.; Edward Vaille, Bakelite Corp.; Paul Holmberg, Arrow Hart & Hegeman, Inc.; Jack Cavanaugh, Standard Tool Co.; John Resseguie, Tennessee Eastman Corp.; and Mario Petretti, Rogers Plastics Corp.

In the business session preceding the symposium, Section President Sherwood L. Young, Church Mfg. Co., announced the new officers and directors for the coming year, as follows: president, Mr. Vaille; vice president, H. Hasenzahl, American Optical Co.; secretary, R. Crawford, Monsanto Chemical Co.; treasurer, M. Nickerson, DeBell & Richardson; national director, Mr. Young; and new directors, James Dunn, Church Mfg., Emil Marciniak, A. G. Spalding & Bros., Inc., and John Mallory, Parker Stamp Works, Inc.

Joint SPE-SPI Local Meeting in Chicago

The Chicago Section, SPE, and the Midwest Chapter, SPI, held a regular joint dinner-meeting on December 8 at The Builder's Club, Chicago, Ill. Eighty-five members and guests of the two groups heard featured speaker Elmer E. Mills, Elmer E. Mills Corp., talk on "What You Pay for and How You Sell It." Mr. Mills described the system used by his company for developing an estimating formula for uniformly pricing plastic products. This pricing is done by using operations figures of previous years, and from these figures developing a formula to estimate as accurately as possible what the price of a product should be. Such a system must be based on the operations of a particular company and is subject to alterations if conditions change. As operations become more efficient, the price will lower; while the converse is also true.

In the business session preceding the talk the results of the recent mail balloting to elect three new directors of the SPE Section were announced. The new directors, elected to three-year terms, are Morris Meltzer, Service Plastics Co.; Ray Olson, Federal Tool Co.; and Stanley Peters, Monsanto Chemical Co.

New York Section Holds First Party

Instead of a regular technical meeting, the New York Section held its first annual Christmas party on December 21 at the Hotel Shelburne, New York, N. Y. More than 60 members and guests attended the affair, which featured a cocktail hour, dinner, entertainment program, and distribution of prizes. Following the dinner, President Stanley Bindman, Noma Electric Co., announced the new officers for 1950, as reported in our December issue. The results of the recent mail balloting for new directors were also announced, with the following elected: Leo Adenbaum, Accurate Molding Co.; B. A. Boucher, Durite Division, Borden Co.; C. W. Kleiderer, Arnold Brilhart, Ltd.; and W. A. Ward, American Cyanamid Co. Table favors were distributed through the courtesy of Koppers Co., Inc., Tennessee Eastman Corp., and Monsanto Chemical Co., and the formal program concluded with a drawing for 11 door prizes donated by plastics and supplier companies and the distribution of grab-bag prizes to all attending.

Newark Section's Holiday Fete

The Newark Section held a Christmas party on December 14 at the Military Park Hotel, Newark, N. J., instead of the regular monthly technical meeting. Approximately 75 members and guests attended the affair which included a dinner, followed by a social program of songs and musical selections featuring a barbershop quartette.

New officers of the group for the 1950 season were announced after the dinner, as follows: president, Russell B. Akin, E. I. du Pont de Nemours & Co., Inc.; vice president, Edward B. Soules, Detroit Mold Engineering Co.; and secretary-treasurer, Edward W. Rowan, Dillon Beck Manufacturing Co.

New Hycar-Phenolic Compounds

THREE new Hycar-phenolic molding compounds have been announced by the chemical department, General Electric Co., Pittsfield, Mass., supplementing the company's earlier wood-flour-filled Hycar-phenolic materials. The new compounds are: G-E 12494, asbestos filled; and G-E 12808, cotton flock filled; and G-E 12809, fabric filled. Each of these compounds has unusual shock, vibration, and fatigue resistance, plus the characteristics of the filler material. The internal resiliency of these materials is derived from their Hycar rubber component, a product of B. F. Goodrich Chemical Co., Cleveland, O.

These new compounds extend the range of impact resistance for thermosetting molding materials, permitting their use in applications formerly considered impossible. Drop-ball tests used by G-E indicate that these compounds have shock resistance five to 10 times as great as equivalent conventional phenolic molding materials. These tests also indicate that parts molded from the compounds will withstand severe mechanical abuse after cracking before complete failure occurs. Their outstanding abuse resistance reduces breakage of molded parts during shipping, handling, and assembly-ing operations.

Metallic Finish Upholstery

A NEW type of metallic finish upholstery material for baby carriages, which is said to be highly resistant to aging, weathering, and sun exposure, was announced by United States Rubber Co., Rockefeller Center, New York 20, N. Y. Called Naugalite, the material is being made in the following metallic colors: French gray, military blue, turquoise, gray-blue, and silver gray. Baby carriages upholstered with the new product are expected to be introduced by manufacturers at the January Furniture Market in Chicago.

In addition to its metallic finish, Naugalite has a high luster and sheen; is tough, yet soft and flexible; is waterproof and easy to clean with soap and water; and is scuff-proof and highly resistant to scratching, tearing, and stains. The company produces the new material by adding metallic pigment to the synthetic resin finish made at its Mishawaka, Ind., plant. The pigments are ground into the mixture and applied to the fabric surface in a double coating operation; special equipment which was developed by the company is used.

Embossing Designs Library

THE recovery of the world-renowned Dornbusch library of 30,000 original grains and designs for engraving or embossing plastics, textile, rubber, leather, paper, and metal foil has been announced by F. A. Ringler Co., New York, N. Y. These graining patterns, used for applying textures and sculptured effects, had been reported destroyed by Allied bombing during the war, but were found preserved in a vault by Ringler President Justin F. Schiess and his attorney, Louis Goldring, during a recent trip to Germany. Reporting the find to Joint Export & Import Agency officials in Frankfort, Messrs Schiess and Goldring were granted sole Western Hemisphere sales rights to the Dornbusch graining plates and graining machines.

Sample swatches and impressions of the Dornbusch patterns will be available to manufacturers as either engraved steel rolls or electrode plates. The newest Dornbusch developments, a radically designed and highly efficient new roller embossing machine and a combination calender and printer that grains, tips, or inlays, will also be shown by Ringler.

Standard for Polystyrene Tile

A RECOMMENDED Commercial Standard for Polystyrene Plastic Wall Tiles and Adhesives for Their Application has been submitted by the Commodity Standards Division, National Bureau of Standards, Washington 25, D. C., to manufacturers, distributers, users and other interested groups for their consideration and acceptance. This recommended standard establishes a minimum standard of quality through approved methods of test, materials, requirements for workmanship, tolerances, thickness, opacity, internal stress, colorfastness, and other details of manufacture to insure a satisfactory product. Requirements for the adhesives to be used for installing the tiles are also covered in the standard, and the appendix includes a standard procedure for tile installation. Mimeographed copies of the recommended standard are available upon request to the Division.

SPI Plastics Seminar

A PLASTICS seminar on the use of plastics in military ordnance was held on November 15 and 16 at the Shoreham Hotel, Washington, D. C. Sponsored by the Society of the Plastics Industry, the seminar attracted an attendance of some 250 industrialists and government research men. Ten papers were presented, and abstracts follow:

"Current Ordnance Problems in Plastics." Lucius Gilman, Ordnance Department Plastics Laboratory, Picatinny Arsenal. Discussed was the application of plastics to ordnance equipment, and some of the problems confronting this work were reviewed. Some requirements still to be solved include a method for putting ends on glass base laminate tubing so as to obtain high resistance to internal pressure; a better material for windows in side curtains of jeeps and other automotive equipment; a method to check proper heat sealing of polyethylene film; and others.

"Plastics Specifications in the Federal Government." Gerald Reinsmith, Office of the Chief of Ordnance, Department of the Army. Points covered were: the philosophy and types of federal plastics specifications and their preparation; interim specifications; standardization work; activities of the Federal Specifications Board and the Munitions Board Standards Agency; and coordination of efforts of the various groups preparing specifications.

"Reinforced Plastics Solve Many QM Problems." R. W. Ehlers, Research & Development Branch, Office of the Quartermaster General. The solving of many problems confronting the Quartermaster Corps by the use of reinforced plastics was described. Many of these applications were discussed in detail, and it was shown how the use of these plastics often permit more simplified designs in the finished parts. Items particularly adaptable to the application of reinforced plastics include field desks, typewriter cases, furniture, portable shelters, helmets, caskets, and containers.

"Naval Ordnance Requirements for Plastics." Albert Lightbody, Plastics Division, Naval Ordnance Laboratory. Specific cases were mentioned where plastics have been used or have failed in applications in naval ordnance. It was also pointed out that the failures have resulted from misapplication of plastics; while satisfactory uses have involved proper understanding of plastics and their properties.

"Plastic Development and Application in the Corps of Engineers." Solomon Goldfein and Philip Mitton, Materials Branch, Corps of Engineers. Cited were the following needs of future plastics development: (1) a textile fiber as strong as cotton, but superior in mildew resistance, with good adherence to synthetic rubbers and plastics, and high modulus; (2) a method for high-speed heat sealing of plastic fibers; and (3) a substantial reduction in cost of polyester resins for laminating.

"Plastics in Aircraft." W. G. Ramke, Air Materiel Command, Wright-Patterson Air Force Base. In the review of satisfactory applications of plastics in aircraft, discussed were the use of thermoplastics in molded, extruded, and cast sheet forms; thermosetting molded plastics for electrical insulation; high-pressure laminates for pulleys and other parts; low-pressure laminates for radio antenna housings; and plastics coatings and adhesives in structural metal-to-metal bonds.

"Some Air Force Electronic Requirements for Plastics." Fred H. Behrens, Air Materiel Command. Dealt with were the use of expanded plastics for radomes, rain erosion of laminated plastics, and thermally stable general-purpose dielectrics, showing how the particular properties of plastics have been utilized to give satisfactory applications.

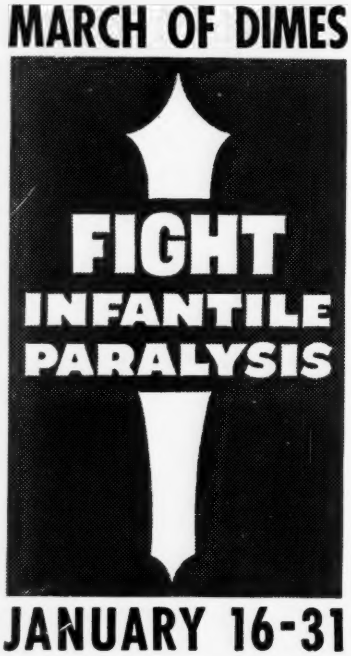
"Plastics for Recording Surface Finish and Wear in Machines." John W. Sawyer, Bureau of Ships, Navy Department. Described was a method developed by the Bureau for using a free-flowing polyester resin to give permanent, three dimensional, highly accurate reproductions of wear encountered on the surfaces of machine parts.

"Coated Fabrics and Thin Films in Quartermaster Applications." John R. Couture, Research & Development Branch, Office of the Quartermaster General. Past work and present status of research on coated fabric were detailed as well as the future program, the development of a coated fabric for raincoats of about half the weight of the present fabric with at least twice its tearing strength. This fabric must be flexible over a wide temperature range and be immune to the attack of fungi and bacteria.

"Recent Developments in Transparent Plastics for Aircraft." W. R. Koch, Air Materiel Command. Requirements for transparent plastics in aircraft include clarity, durability, formability, low density, high shatter resistance, protection from ultraviolet radiation, heat resistance, and electrical conductivity of exterior surfaces. Work in progress to develop new plastics or modify existing plastics to meet these requirements was also considered.

National Plastics Exposition

THE small plastics manufacturer will get a break at the 1950 National Plastics Exposition, which will be held at the Navy Pier, Chicago, Ill., on March 28-31. Recognizing that the cost of more elaborate displays has reduced participation of moderate budget firms in the large national shows, the Society of the Plastics Industry's exposition committee has developed a complete prefabricated packaged booth which is its own self-contained shipping case. For one overall rental price exhibitors will obtain a complete booth, including shipment to and from the exhibition hall. The plywood booths, equipped with plastic name plates, fluorescent lighting, closed storage cabinets, shadow box displays, and advertising panels, will be available in two sizes for 10- and 15-foot booths.



Kel-F Suspensoid

IN RESPONSE to many queries, M. W. Kellogg Co., Jersey City 3, N. J., has announced that a suspensoid form of Kel-F for application by spraying, dipping, and other coating methods has been under laboratory study for some time and will be announced in the near future. The company is confident that the Kel-F product used in this manner will retain all of the superiorities that its unique physical properties give to the standard product, a high-temperature thermoplastic of ready moldability by all conventional methods.

New Durez Molding Compound

A NEW phenolic molding compound especially formulated for making washing machine agitators or parts operating under similar conditions has been announced by Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y. Designated as Durez 14899 Black, the material is designed to meet the demand of washing machine manufacturers for a plastic agitator that will have good surface luster and finish after repeated immersion in hot soap and detergent solutions.

The new compound is claimed to show no effect on finish after 24-hours' immersion in boiling soap-water solutions, and to have faster cure and better dimensional stability than any other plastic agitator material yet available. The new compound has high impact strength and very low moisture absorption. A similar material in scarlet color is also available.

Rubber Formulary Expands Service

AN EXPANSION of its service to include cataloguing and indexing of rubber and vinyl compounds from technical releases distributed by supplier companies to the rubber industry has been announced by the Rubber Formulary, 115 George Hay Bldg., Bakersfield, Calif. Up to the present only compounds published in technical journals have been included in the monthly shipments of punched cards to subscribers.

Under the new service the Formulary will include information taken from company releases on compounds designed for manufacture of a specific article; compounds designed to excell in a particular property; and compounds having physical properties in ranges not often reported in technical journal articles. Supplier companies are invited to send copies of their publications to the Formulary for inclusion in the punched card system.

Scientific and Technical Activities

A Progress Report on "Cold Rubber"[1]

B. M. G. Zwicker[2]

FACTORS which affect the future of the American synthetic rubber industry are: (a) the total demand for rubber goods; (b) the available supply of all rubbers—natural, synthetic, and reclaimed; (c) relative worth and cost of the competing rubbers; (d) political restrictions on the free production, transportation, and consumption of any of the rubbers; (e) general economic conditions in the producing and consuming areas (relative standards of living); and (f) continued availability of related raw materials (motor fuel, vehicles, etc.) with which the major uses of rubber are associated.

The discussion in this paper will be restricted to the first three items, where at least some of the facts are available.

Demand

About half of the industry consumption of new rubber is within the United States. Peak consumption in postwar years was required to fill the war-born shortages of rubber products; world consumption of new rubbers is expected to fall to about 1,855,000 long tons in 1950, of which 925,000 long tons will be used in the United States. The long-range upward trend may be resumed after 1950 if no serious economic or political disruptions intervene. To this demand must be added replenishment of strategic stockpiles in the United States and other countries.

Supply

The table below shows U. S. Department of Commerce figures for actual production of rubber in 1948, estimates for 1949 based on current rates, and the International Rubber Study Group's estimated potential productive capacity for natural and synthetic rubbers of all types.

TABLE 1. NEW RUBBER PRODUCTION
(Thousands of Long Tons Per Year)

	1948	1949	Potentia
Natural Rubber	1,520	1,490	1,850
Synthetic Rubber			
United States	488	410	757
Others	30	25	60
Total	2,038	1,925	2,667

Balance

According to current estimates, the natural rubber available to the world for strategic stockpile in 1949 will be even less than the 100,000 long tons in 1948. As long as such a shortage in natural rubber supply exists, American synthetic rubber production can be expected to continue.

The 1950 consumption of GR-S and GR-I (Butyl) will range between 250,000 and 300,000 long tons. The U. S. Department of Commerce Rubber Industry Advisory Committee estimates that 38,000 long tons of neoprene and nitrile type rubbers will be consumed in 1949 and 34,000 long tons in 1950. Total consumption of American synthetic rubbers in 1950 may be 285,000 to 335,000 long tons in 1950.

A prescribed usage level for American synthetic rubber is a recognized control in the interest of our national security. The best interests of everyone, even the natural rubber producer, would be served if continued production of American synthetic rubber *in substantial volume* could be assured on the basis of competitive private enterprise, free of government controls. To accomplish this end, two things appear necessary; first, an economically sound plant disposal program to attract the necessary investment capital (a matter to be considered by Congress before June 30, 1950) and, second, synthetic rubber of sufficient merit to command a price equal to or preferably slightly higher than natural rubber for transportation uses.

How Good Is "Cold Rubber"?

"Cold rubber," or GR-S polymerized at 41° F., differs from regular GR-S polymerized at 122° F. in the use of special redox systems capable of releasing polymerization initiating free radicals at very low temperatures. Dehydro rosin soap is used in almost all "cold rubber" now being made.

To the polymer research chemist, the three rubber hydrocarbons are compared by the data in Table 2.

TABLE 2. RUBBER HYDROCARBON COMPOSITIONS

Structural Units	No. 1 R.S.S.	GR-S-10	"Cold Rubber"
Isoprene	98% cis	....	....
Styrene	....	23.5±0.5%	23.5±0.5%
Butadiene, 1,4, addition	....	66.2% trans 4.5% cis	73.5% trans 2.3% cis
Butadiene, 1,2, addition	....	29.3%	24.2%
Mol. wgt. avg.	1,500,000	250,000	250,000
% Less than 75,000	5%	30%	10%

A practical rubber chemist compares the polymers by the tests shown in Table 3.

TABLE 3. RUBBER EVALUATION

	No. 1 R.S.S.	GR-S-10	"Cold Rubber"
Mooney viscosity, 212° F.	80-105	50-60	48-62
Avg. % gel	15	5	5
Intrinsic viscosity in Benzene, avg.	1.0	1.5	1.8

Processibility

Laboratory processing data shown in Table 4 were obtained in typical tread compounds containing 50 parts EPC black with 10 parts of softener oil, mixed in a Type B laboratory Banbury at 340° F. maximum temperature.

TABLE 4. PROCESSIBILITY OF COMPOUNDED RUBBERS

	Natural Rubber	GR-S-10	"Cold Rubber"
Mooney viscosity, ML On rubber	100	55	55
Mooney viscosity, ML On compound	52	57	64
Extrusion rating Garvey die	13	11+	12
Mill Shrinkage, %	12	30	35

When GR-S first became available, its "poor processibility" relative to natural rubber was a subject of much concern to the rubber factories. In a short time ways had been found to handle it economically. Similarly, a year ago the slow breakdown rate of "cold rubber," as compared with GR-S, was a major factory problem; while today many factories have found ways of handling it more economically than either GR-S or natural rubber. Some of the current methods may be deteriorating to tire quality, but factory experience in handling "cold rubber" has been too brief to say that the matter cannot be resolved satisfactorily.

Product Quality

Typical tread recipes with 27% volume loading of EPC carbon black and 10 parts of softener oil, mixed on a laboratory mill, and vulcanized to an "optimum" state of cure, displayed the properties indicated in Table 5 for the three rubbers.

TABLE 5. VULCANIZATE PROPERTIES—TREAD RECIPE

	Natural Rubber	GR-S-10	"Cold Rubber"
Tensile strength, psi	4200	3300	4250
300% Modulus, psi	1200	1040	910
Elongation, %	645	630	710
Rebound (Schopper), %	40	33	38
Compression set, % ASTM D395, Method B	53	37	43
Gehman* T_{10} °F	−62	−44	−40
T_{100} °F	−72	−54	−53

* Temperature at which modulus is 10 and 100 times that at room temperature.

Comparison of these properties indicates that a "cold rubber" tread compound has come reasonably close to duplicating one made from natural rubber in ultimate physical strength and rebound, has lower compression set (as does GR-S), but is inferior to natural rubber in low temperature flexibility. The freeze resistance of butadiene-styrene copolymers can be improved by decreasing the quantity of bound styrene in the polymer. Tire tests on "cold rubbers" containing less than 20% bound styrene have been performed and are of sufficient promise to warrant large-scale manufacturing tests.

Special laboratory tests of particular interest to the tire manufacturers, such as cut growth resistance with flexing, heat build-up, tear resistance, and retention of physical strength and elongation at elevated temperatures, are listed in Table 6. A. E. Juve has defined the ratio of flex resistance (to a given crack growth) with heat build-up as the quality index for the rubber and has given GR-S a rating of unity for purposes of comparing various rubbers at equivalent hysteresis levels.

TABLE 6. VULCANIZATE PROPERTIES, (*Cont'd*)—TREAD RECIPE

	Natural Rubber	GR-S-10	"Cold Rubber"
Flex Resistance* x 10^{-3}	1500	100	320
Hysteresis†, T, °F	43	60	61
Quality index	25	1	3.2
Crescent tear, lb. / 0.1-in.	69	35	41
Retention of Properties at 212° F.			
% Tensile strength	60	36	30
% Elongation	112	63	66
% 300% modulus	100	86	78

* Flexures to rating of 8 on De Mattia Flexometer from pierced sample.
† At 212° F. ambient temperature.

While "cold rubber" shows positive im-

[1] Based on a paper presented before the Texas-Louisiana Gulf Section, A. C. S., Beaumont, Tex., Nov. 16, 1949, and before the Trenton, N. J., Section, Dec. 13, 1949.
[2] B. F. Goodrich Chemical Co., Cleveland, O.

provement over GR-S in quality index and tear resistance, it still falls far short of natural rubber in these important properties. It has also failed to show improvement in retention of properties at elevated temperatures.

During the past two years a large number of independent tests has been conducted on tires made from cold rubber. This testing has resulted in tread-wear quality of about 117% as compared with GR-S tires at 100. Ratings have varied from equivalent to as much as 145%.

During the past 10 months there is evidence of some drop in average quality from earlier tests, and this may conceivably be due to steps that have been taken by rubber factories to overcome processing difficulties. It is safe to conclude that "cold rubber" wears significantly longer in a tire tread than does GR-S. In addition, tread crack growth resistance, a sensible deficiency in GR-S tires, is at least twice as good in "cold rubber" tires.

On a selected average, natural rubber tread wear tests fall between "cold rubber" and GR-S. Crack growth resistance in a properly made natural rubber tire is superior to that in either of the American synthetic rubber tires.

In conclusion, it appears that "cold rubber" is significantly better than GR-S for tire treads. With our present knowledge it is probably not sufficiently better than natural rubber for this purpose to command a substantially higher price than natural rubber in a free market. It does not seem to offer sufficient quality improvement to meet top requirement for a carcass rubber.

"Super-Cold Rubbers"

Emulsion polymerization can be effected at temperatures as low as —40° F. if antifreeze is added to the recipe and sufficiently active redox catalyst systems are employed. While manufacturing costs at 41° F. are not seriously increased over those for GR-S, rubber made in anti-freeze systems would become substantially more expensive.

Laboratory evaluations of such rubbers copolymerized at sub-freezing temperatures have shown a continuation of the trends already defined for 41° F. rubber. Tensile strength plateaus at a polymerization temperature of about 15° F., and quality index improvement becomes less pronounced, tending to level out at about 5. There is some evidence for mild improvement in retention of stress-strain properties at 212° F. which was not indicated in 41° F. rubber.

Data on tire tests are still too scarce to draw definite conclusions. There are evidence for some further improvement in tread wear and more positive evidence for improved tread crack growth resistance, but no indication of a revolutionary trend. We must conclude that large-scale replacement of economical "cold rubber" for more expensive "super-cold rubber" for tires is not imminent.

Data obtained in the B. F. Goodrich Research Laboratories under the Office of Rubber Reserve Research Program by measurement of infrared absorption on solid polymer samples disclose the perfectly linear increase of trans 1-4 polymerization to nearly 80% at the expense of the less desirable 1-2 polymerization as the temperature is reduced to —18° C. (0° F.).

Data obtained in the Firestone Research Laboratories, also under the ORR Research Program, by fractional precipitation and subsequent molecular weight determinations show a substantial decrease in low molecular weight material in the butadiene-styrene copolymer as the polymerization temperature is reduced.

From studies such as these we will soon know why "cold rubber" is superior in some qualities and inferior in others. It is upon such foundations that ideas for even better rubbers can be evolved and thus insure a free and competitive American synthetic rubber industry.

The data obtained in this work were sponsored by Reconstruction Finance Corp., Office of Rubber Reserve, in connection with the Government Synthetic Rubber Program.

Rubber & Plastics Division, A.S.M.E., Annual Meeting

F. W. Warner

THE Rubber & Plastics Division of the American Society of Mechanical Engineers held a one-day session as part of the annual meeting of the parent Society at the Hotel Statler, New York, N. Y., November 29, 1949. Two technical sessions, one on plastics and one on rubber, an informal luncheon, and a meeting of the executive and general committees of the Division comprised the program.

Plastics Session

The first session on plastics had as its chairman and vice chairman, Glenn W. Neely, The Richardson Co., and F. W. Warner, General Electric Co., respectively. A paper entitled "Long Time Tension and Creep Tests of Plastics" by C. E. Staff and H. M. Quackenbos, Bakelite Corp., and J. M. Hill, Jr., was first on the program. Thermosetting and thermoplastic materials were maintained under constant load at 25 and 75° C. for periods ranging from 1,000 to 14,000 hours. Creep was measured with electric strain gages, and from its course an estimate was made of all the maximum stresses that could be sustained for five years by the thermosetting materials. Some concern was expressed by the authors as to the effect of the use of the electric strain gages in view of the reinforcing action of the gage when cemented on the test sample.

The second paper on the plastics program was entitled "A Theory of the Mechanical Properties of Hot Plastics" by Samuel J. Loring, consulting engineer. This paper described the development of a mathematical theory of large strain, rubber-like elasticity combined with stress relaxation, which is the character of the behavior of hot plastics indicated by a series of high extension rate tests on such materials as polystyrene, polyethylene, cellulose acetate, etc., in the molten or "soft" state. The work represented by this paper, which was done for Plax Corp., was further explained by John Bailey, of that organization, who stated that it had been undertaken in an effort to provide a theoretical basis for a study of the plastics extrusion process.

"Advances in Plastics, 1948-1949" was given by John E. Faloon, General Electric. Continued advances in the field of plastics, as evidenced in the technical literature published between October, 1948, and July 1, 1949, were presented. New developments in materials included mention of fluorcarbons, improved polystrene, nitrile-phenolic combinations, colored nylon molding powders, etc. Single-dip vinyl coatings of as much as 3/32-inch, a flame-spraying technique for polythene, and advances in low-pressure molding were listed under advances in processing.

Compounding and extruding thermoplastics in the same unit were briefly described under the equipment heading.

Included with the multitude of new applications for plastics were the fabrication of larger and larger molded parts, thin plastic lens with performance equal to thick glass lens, and leather of improved wear characteristics by virtue of impregnation with methyl methacrylate resin.

Reflecting fundamental progress in materials and processes, the products of the industry continue to find new fields of application while retaining those already established, this author said in conclusion. Although perhaps less spectacular than in some past periods, the plastics industry will continue to advance on a dynamic but orderly basis, he added.

Rubber Session

Chairman for the session on rubber was E. N. Cunningham, of Enjay Co., and vice chairman was H. M. Frecker, United States Rubber Co.

The first paper of this session was on the subject of "Compression Stress Relaxation of Some Rubber and Synthetic Rubber Vulcanizates" by J. R. Beatty and A. E. Juve, of the B. F. Goodrich Research Center. Stress relaxation in compression is a major factor governing the service life of rubber in many applications. A tester and a test procedure have been developed in the laboratory with which it is possible to measure this property with reasonable speed and accuracy. The results of a research program conducted using this tester, in which the effects of polymer as a function of the variables of temperature, degree of deformation, sample shape and size, and sample slippage were investigated, were discussed.

"Design Data on Natural and Synthetic Rubbers for Mechanical Engineers" was presented by E. F. Riesing, Firestone Tire & Rubber Co. Mr. Riesing, chairman of the applied rubber engineering committee of the Division, gave data on rubber as an

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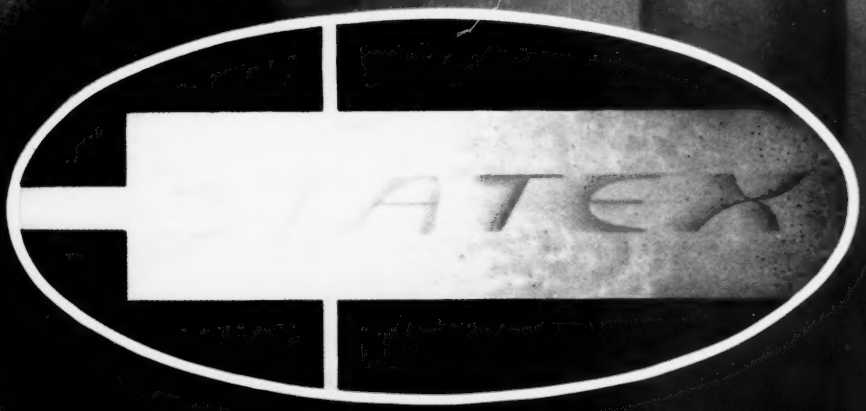

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engineering material for use by mechanical engineers involved in the design of rubber parts, who might not always be able to avail themselves of such data as found in the files of the rubber goods manufacturing companies. Tables of properties for natural, neoprene, butadiene-styrene, butadiene-acrylonitrile, and Butyl rubbers were presented, and procedures for the design of rubber parts loaded in compression and shear explained. This paper is the first of a series that will be presented in the course of the next several years until all the design data on rubber that can be obtained are recorded in the literature.

"Advances in Rubber, 1948-1949," the annual literature review paper of the Division, was again presented by Lois W. Brock, G. H. Swart, and E. V. Osberg, General Tire & Rubber Co. This very comprehensive review covering new developments and processes in elastomers, polymerization, latex; compounding, curing and aging; fundamental properties, rubber fabrication and testing; and engineering properties and applications contained more than 800 references to the published literature.

In presenting this paper Mr. Osberg did not follow closely the text of the paper because of its considerable length, but discussed instead developments in the rubber industry during the past year. He first mentioned that the industry was going through a period of readjustment since supply of most rubber products has now caught up with the demand. Tire prices have been too low for profitable operations, but a new attitude is developing as indicated by the price increases recently announced by most of the manufacturing companies.

Diversification in the rubber industry, which has been gathering momentum during the postwar years, now knows no bounds, as evidenced by the participation of rubber companies in plastics, chemical, and many other fields of production.

The competition between natural and synthetic rubbers involves both technical and political considerations, it was said. The price of first-grade natural rubber is now 2¢ a pound less than GR-S but actually 73% of the rubber used is of lower grades, which sell for 3¢ or more a pound less than GR-S. With a differential in price of 3¢ a pound or more, a 50% drop in synthetic rubber consumption was forecast. Mandatory use of synthetic rubber was still recommended to prevent the failure of that industry, so important to our national security.

"Cold rubber" production at the rate of 198,000 tons a year had been promised by the Office of Rubber Reserve by November 15, 1949. Compounding research on this rubber is at a preliminary level, but tires of this synthetic do show better abrasion resistance and equal resistance to cracking when compared with natural rubber tires. Heat build-up characteristics are not so good, and "cold rubber" still lacks building tack, but 20% natural rubber would be sufficient for tire producers in an emergency, it was stated.

It was predicted that free competition between natural and synthetic rubbers would not be possible for some time to come. Increased rubber consumption by virtue of its use in roads, for foamed sponge, and as a chemical raw material was mentioned.

New legislation on rubber required by July 1, 1950, may be of temporary nature and not too definite in its direction because of the continuing differences of opinion between some of the large and small rubber companies. This situation is further complicated by the reluctance of some of the government agencies concerned with rubber to give up their present powers, the speaker declared.

W. Newlin Keen

Executive and General Committee Meeting

At the meeting of the executive and general committees of the Division the election of the new chairman, Frank W. Warner, General Electric, to replace the retiring chairman, D. H. Cornell, Goodrich Research Center, and the election of the new secretary, W. Newlin Kenn, E. I. du Pont de Nemours & Co., Inc., were the first order of business.

The traditional gavel, made of both rubber and plastics, was presented to J. F. Downie Smith, 1947 Division chairman, by Mr. Cornell.

The election of A. G. Gifford, Lord Mfg. Co., to the executive committee, and R. R. Williams, General Motors Corp., to the general committee was also announced.

It was decided to try to arrange a joint technical session with the Textile Division at the meeting of the Society in Worcester, Mass., September, 1950, and another joint technical session with the Machine Design Division at the annual meeting in New York, December, 1950. The first session is to be on the subject of the use of rubber and plastics in textile machinery, and the second on the use of rubber and plastics in shaft seals.

Mr. Riesing reported that he was having good response to his requests for unpublished engineering data on rubber from the various rubber companies and that material for papers on this subject should permit at least one paper a year for presentation before the Division.

New York Meeting, Division of High-Polymer Physics, A.P.S.

THE Division of High-Polymer Physics of the American Physical Society will hold sessions on Thursday morning and afternoon, February 2, and Saturday morning and afternoon, February 4, at the Polytechnic Institute of Brooklyn, 85 Livingston St., Brooklyn, N. Y., and at Columbia University, 116th St. and Broadway, New York, N. Y., on Friday morning, February 3, as part of annual meeting of the Society. The meeting at Columbia University will be in the form of a symposium of the Division on stress phenomena from the respective viewpoints of solid-state and high-polymer physics.

The chairman of the Division of High-Polymer Physics is J. W. Liska, Firestone Tire & Rubber Co., Akron, O. The chairman of the program committee for this New York meeting is W. L. Davidson, The B. F. Goodrich Co.

A program of 28 papers has been scheduled, and abstracts of all of these papers except those included in the above-mentioned symposium are given below. The authors of the papers to be given at the symposium were not asked for abstracts of their presentation according to the program chairman.

Abstracts of Papers

FEBRUARY 2 AT 10:00 A.M.—J. W. LISKA, PRESIDING

Incubation of Plastic Shocks in Certain Polymeric Films. John Kauffman and Waller George, U. S. Naval Research Laboratory, Washington, D. C.

The existence of a time delay between the rapid application of a load and the appearance of plastic flowing has been demonstrated in mild steel by Clark and Wood.[1,2] Recently the authors discussed a similar time delay for the appearance of a form of localized plastic flowing in commercial polyamide films.[3] The localization involves a thickness reduction of the specimen (a type of local necking) which can be made to propagate along the specimen. It has been tentatively interpreed in terms of von Kármán's[4] plastic wave theory as a "plastic shock." Under suitable dead weight loading the "shock" is observed to propagate after the elapse of the delay time. Plastic flowing events occur within this delay time which lead to the abrupt formation of the shock. The collection of these events preceding the final localization of flowing is termed its "incubation." This paper will describe the incubation processes with the aid of motion pictures and polarized light for selected polyamide and polyethylene films. The description will include the initiation and growth of "bands" of distortion in regions of maximum average shear stress and their collapse into the fully formed shock.

Fracture Markings in Plastics. J. A. Kies and A. M. Sullivan, U. S. Naval Research Laboratory.

Many gross features of fracturing in solids can be modeled, and chosen features can be emphasized on fractures in selected polymeric solids. Discontinuous fracture and backwards propagation of isolated elements simultaneous with the advance of the crack head are demonstrated. The origins of chevrons and other geometrical

[1] *Am. Soc. Testing Materials. Proc.*, Preprint No. 25 (June, 1949).

[2] P. W. Bridgman has called our attention to his observation of similar effects in higher alloyed steels reported in *J. Applied Phys.*, 17, 225 (1946).

[3] J. Kaufman and W. George, *Bull. Phys. Soc.*, 24 (7) 30 (A) (Nov., 1949). W. George, Symposium on Dynamic Properties of Polymeric Materials, Polytechnic Institute of Brooklyn, Nov. 19, 1949.

[4] Th. von Kármán, N.D.R.C. A-29, OSRD, 365 (Jan., 1942).

markings, such as ellipses, hyperbolae, and river systems on the fracture surface are explained in terms of multiple initiations and relative propagation speeds of fracturing.

The sequence of events by which rod shaped shards are thrown out during conchoidal fracturing is described. Shatter markings provide a mechanistic explanation of brittle behavior under high overloads. Variations of fracture appearance with overall speed of propagation in cellulose acetate and lucite plates are discussed. A few examples of the applicability of these studies to the interpretation of some large-scale fractures in various materials are cited.

Crystallization and Second-Order Transitions in Silicone Rubbers.[5] C. N. Weir, W. H. Loser, L. A. Wood, National Bureau of Standards, Washington.

In the course of an investigation to determine which rubbers might be suitable for use at low temperatures, interferometric measurements of the length-temperature relationships of silicone rubbers have been made. Crystallization was found between —60 and —67° C. in Dow-Corning Silastic X-6160 and in General Electric 9979G silicone rubber, the latter of which contains no filler. Crystallization between —75 and —85° C. was found in Silastic 250. Melting occurred over a range of temperature above the temperature of crystallization. The volume change on crystallization varied from 2.0 to 7.8%. No crystallization or melting phenomena were observed in Silastic X-6073 between —180 and +100° C. All types of silicone rubber exhibited a second-order transition at about —123° C. the lowest temperature at which such a transition has been observed in a polymer. The coefficient of linear thermal expansion of silicone containing no filler was found to be about 40 x 10^{-5} deg. C. between —35 and 0° C.

Random Noise in Dielectric Materials. R. F. Boyer, Dow Chemical Co., Midland, Mich.

When thin films of various polar plastic materials are used as the dielectric medium for condensers in a high gain circuit whose output is fed to a Brush Recording oscillograph, the application of direct current voltages of the order of 100 volts per mil across the specimen gives rise to two effects. First is the usual rapid exponential decay in current associated with charging current effects, then random bursts of current. These random bursts are believed to be a new effect. The frequency of these random bursts and their amplitude decrease with time, and they finally disappear. Reversal of the current causes the phenomenon to reappear. Polystyrene and polyethylene do not show this effect. Copolymers of vinylidine chloride with 20 to 40% acrylonitrile are quite spectacular. Most polar polymers such as nylon, plasticized polyvinylchloride, saran, paper, cellulose derivatives have a characteristic pattern. The effect may result from ionic impurities which undergo an "activated diffusion" process whenever a hole opens between polymer chains. The process would then be analogous to the activated diffusion of water molecules. The process stops when the ions are all driven to one electrode and will start again on reversing the polarity. Brass electrodes show these effects quite well, silver not at all, and aluminum only slightly. There is a further analogy between this phenomenon and the "avalanches" observed with crystal scintillation counters.

Equivalent Effects of Time and Temperature in the Shear Creep and Recovery of Elastomers. F. S. Conant, G. L. Hall, M. James Lyons, Firestone.

An explicit relationship is set forth for the time-temperature dependence of the *visco-elastic* phenomena in the superelastic polymers. An empirical equation found to represent adequately the above-mentioned relationship over the entire multiple-temperature curve is of the form:

$$\log\ t = \frac{C_\alpha}{T-b} + C_\beta$$

Experimental verification is given for the equivalent influence of time and temperature on the creep and recovery of compounds based on *Hevea*, GR-S, Neoprene GN, Butaprene, and Butyl rubber. A comparison of the empirical equation with that of a theoretical reaction-rate equation of Tobolsky and Eyring indicates a temperature dependence of the energy of activation.

FEBRUARY 2 at 2:00 P.M.—HERBERT LEADERMAN, PRESIDING

Elastoviscous Properties of Polyisobutylene. III. Relaxation of Stress in Whole and Fractionated Polymers. Effect of Carbon Black. R. D. Andrews, F. H. Holmes, A. V. Tobolsky, Princeton University, Princeton, N. J.

Relaxation of stress at constant strain in polyisobutylene has been examined over wider ranges of elongation, temperature, and molecular weight than in previous studies. A stress-strain curve of polyisobutylene elasticity has been constructed from relaxation data at different elongations. In polymers of very high molecular weight, the relaxation regions corresponding to "high temperature" and "low temperature" relaxation processes (the latter being observed in these experiments at temperatures of —30° C. and below) are almost completely separated experimentally. At a temperature of —20° C. very high molecular weight polymer appears in these experiments to be in a pseudo-equilibrium elastic state, with little relaxation observed over a considerable time interval. These data indicate the presence of a temporary network structure in this polymer; chain entanglements presumably act as temporary cross-links between molecules.

Apparent activation energy for relaxation is found to be a function of temperature; its value decreases with increasing temperature. A power law expresses the relaxation rate and molecular weight more accurately than the molecular weight relaxation proposed in Part I of this series.

Fractionation appears to narrow to some extent the distribution of relaxation times which corresponds to the relaxation curve. Inclusion of carbon black in polyisobutylene causes a change of shape of the relaxation curve. Evidences of crystallization are observed at —30° C. in a polymer containing carbon black, at relatively moderate extensions. The applicability of the Principle of Superposition to the elastoviscous behavior of polyisobutylene has been investigated by means of two-elongation relaxation experiments.

Non-Destructive Mechanical Test for Wool Fibers and Some Preliminary Results. Harris M. Burte, Textile Research Institute, Princeton.

The slope of the force extension curve in the linear region before the yield point can, for wool fibers, be non-destructively measured at five- to ten-minute intervals. The change of this slope with time is used to follow the course of the heterogeneous reaction between wool and some reagent. Woods[6] determined the dependence of Young's modulus on relative humidity, but did not investigate any rate phenomena.

Data are presented on the interaction between concentrated aqueous solutions of neutral salts and wool fibers. Two processes occur: (a) relatively rapid hydration or dehydration of the fiber until equilibrium with the partial pressure of water over the salt solution is attained; (b) relatively slow absorption of salt ions by the fiber.

Very concentrated salt solutions dehydrate the fiber so completely that absorption of salt ions is not possible. Swelling experiments, and experiments involving other mechanical properties, confirm this view. The interaction between wool fibers and aqueous solutions of large organic molecules follows a similar pattern. The effect of fiber size and type on the rate of absorption has been studied. The absorption of ions is probably diffusion rate controlling.

Some Theoretical Considerations of Dynamic Property Data on Textile Specimens. W. James Lyons.

1. Early stretch-vibrometer data, of quite extensive character, on the frequency dependence of the internal friction μ of a nylon monofil, has been found to conform to the relation

$$\mu = \frac{\mu_2}{1+\omega^2\tau_2^2} + \mu_3$$

which was deduced independently by Tobolsky and Eyring from considerations of molecular structure. Among other constants evaluated was the relaxation time for the secondary-bond network τ_2, found to have the value 9.3 sec.

2. By more sensitive graphing methods than used heretefore, it was confirmed for the nylon data that the hyperbolic relationship between resonant frequency ω_0 and internal friction μ holds equally as well as the foregoing equation. The two relationships are shown to be nearly equivalent in the experimental range. On evaluation of graphical parameters, the equation

$$\mu\omega_0 = 2.47 \times 10^9 \text{ ergs/cm}^3$$

was obtained.

3. Using the same graphical method with a set of data on 11/4/2 cotton cord the relation

$$\mu\omega_0 = 7.05 \times 10^9 \text{ ergs/cm}^3$$

was established.

Fundamental Studies of Plasticization of Polyvinyl Chloride. M. L. Dannis, B. F. Goodrich Research Center, Brecksville, O.

The softening of a hard resin, polyvinyl chloride, by a liquid, dioctyl phthalate, occurs through a set of processes in sequence. Imbibition of the liquid is accompanied by volume reduction in the system. Dilatometer methods evaluate the amount and rate of volume decrease. The rate is temperature dependent, activation energy about 80 k.cal. Solution of liquid into the resin follows with no further volume, but large dielectric change. Dielectric changes are measured on material in a cylindrical condenser, using a Schering bridge, and are rate dependent, activation energy about 110 k.cal. Data are best described, assuming that segments of the polymer molecule "react" independently of one another.

At fixed temperatures "reaction" rates are directly proportional to vapor pressure of the liquid. The dielectric change may be treated similarly to a chemical reaction between a solid and a vapor, and free

[5] The work reported here was supported by the Office of Naval Research and the Office of The Quartermaster General as part of Project ONR (QMC) NR-033-314.

[6] *Proc. Leeds Phil. Lit. Soc. (Sci.)*, 3, 577 (1940).

energy of activation, ΔF^{**}, evaluated. ΔF^{**} is constant for various liquids with one resin. $\Delta E^{**} = \Delta H^{**} + L$ in this system, where ΔE^{**} is Arrhenius activation energy, ΔH^{**} energy barrier, L latent heat of vaporization of the liquid.

Load Induced X-Ray Line Broadening in Nylon Filaments. Waller George and John Kauffman.

The load induced microscopic structural changes in highly oriented nylon filaments were followed by changes in the X-ray fiber diffraction pattern as a function of the resulting strain. Observations made include (1) changes in the dimensions of the fiber spots and (2) a decrease in ratio of the intensity of amorphous to crystalline X-ray scattering. These new results for Type 200 du Pont nylon indicate a change in the micro deformation mechanism at a strain corresponding to the inflection of the load-strain diagram (14% elongation). The mechanism for smaller plastic strains appears to involve a rotation of the crystallized domains toward alinement with the fiber axis, accompanied by a small overall additional crystallization. For strains larger than the inflectional strain, the mechanism seems to involve a progressive reduction in the domain size, and a reduction in alinement with the fiber axis. Both effects appear to saturate in the vicinity of the rupture strain. These results are discussed in terms of load induced effects found in metal single and polycrystals. It is suggested that the qualitative features observed may be representative of a wide class of load or strain induced micro deformation reactions in the solid state.

Business Session of the Division.

FEBRUARY 3 AT 10:00 A.M.—W. L. DAVIDSON, PRESIDING

Mechanism of Plastic Flow in Single Crystals. Frederick Seitz, University of Illinois, Urbana, Ill.

Structure and Physical Properties of Crystalline Polymers. Herbert Leaderman. National Bureau of Standards.

Rheological Properties of Glass. W. A. Weyl, Pennsylvania State College, State College, Pa.

Internal Friction in Solids. Clarence Zener, University of Chicago, Chicago, Ill.

Static and Dynamic Viscosities of Amorphous Polymers. A. V. Tobolsky.

Discussion. Leader, M. L. Huggins, Eastman Kodak Co., Rochester, N. Y.

FEBRUARY 4 AT 9:00 A.M.—S. L. DART, PRESIDING

Emulsion Polymerization with Ultrasonic Vibration. A. S. Ostroski and R. B. Stambaugh, Goodyear Tire & Rubber Co., Akron.

Emulsion-type polymerization reactions have been accelerated by irradiation with ultrasonic energy.

A magnetostriction oscillator at 15 KC. gave essentially the same results as a piezoelectric oscillator at 500 KC. The rate of formation of polystyrene was doubled, and higher final yields were obtained using about 0.03-watt of vibrational power per cubic centimeter of latex. Experiments were made to separate local heating effects from the pure vibration energy.

A thermostatted stainless steel cell was developed for irradiating butadiene emulsions under pressures up to 60 p.s.i. About ½-watt of vibrational power per cubic centimeter of latex doubled the rate of reaction for GR-S, Redox, and Redsol formulae.

The ultrasonic intensity apparently must exceed a critical value before any appreciable accelerative effect is observed. The time to reach a given yield of polymer is approximately inversely proportional to the power used.

Rotating Specimen Mount for Use with X-Ray Spectrometer in Measuring Crystallite Orientation of Cellulose and Other Textile Fibers. Leon Segal, Joseph J. Creely, Carl M. Conrad, United States Department of Agriculture Southern Regional Research Laboratory, New Orleans, La.

The quantitative evaluation of crystallite orientation in textile fibers by X-ray methods is discussed. It is found that photographic recording and photometering of the resulting films can be replaced by automatic recording on a strip chart with the aid of an X-ray spectrometer with Geiger-Müller counter. The design and details are given for a specimen holder capable of properly positioning and rotating a bundle of fibers in the X-ray beam so that the 002 or other selected diffraction arc passes before the window of the counter. A tentative procedure is outlined for evaluating with the aid of this apparatus the crystallite orientation of a bundle of cellulose fibers. Some typical recordings of the intensity curves of the 002 arcs from ramie, cotton, and high-tenacity rayon are presented.

On Crazing of Linear High Polymers. C. C. Hsiao and J. A. Sauer, Pennsylvania State College.

The effect of various variables, such as type of stress, stress magnitude, duration of stressing, and environment on the initiation and development of crazing in linear polymers, is discussed. The basic nature of crazing is investigated in some detail for polystyrene specimens by means of the light microscope, the electron microscope, and the X-ray spectrometer. The results of these observations and their bearing on the fundamental group structure of the polystyrene molecules are presented.

The relationship between crazing and orientation is discussed, as well as the effect of both these factors on the mechanical properties. The experimental results are compared, wherever possible, with the previously reported data of other investigators. A short discussion is then given of a theory of crazing from the point of view of the molecular structure of the material.

Equation of State for High Polymers. R. S. Spencer and G. D. Gilmore, Dow.

In the former paper[7] the authors suggested the following equation of state,

$$(P + \pi)\ (V - \omega) = RT,$$

where π is the internal pressure (or cohesive energy density), and ω is the volume at absolute zero. It was found that this equation was in good agreement with data on the thermal expansivity and isothermal compressibility of polystyrene.

The present paper reports isothermal compression measurements on polymethyl methacrylate, polyethylene, cellulose acetate, and ethyl cellulose, within the fabrication range of temperature. The above equation of state is shown to apply equally as well to these thermoplastics as to polystyrene, and values are given for the constants π and ω. The usefulness of this relation is illustrated in a brief discussion of some phases of the injection molding process.

Behavior of Granulated Polymers under Pressure. R. S. Spencer, G. D. Gilmore, R. M. Wiley, Dow.

In such fabricating processes as extrusion and injection molding it is frequently necessary to force a granulated polymer through a channel. Frictional forces between polymer and channel walls lead to a drop in pressure through the granular material. Simultaneously, the applied pressure causes a compaction of the granules.

If we assume that the granular mass has certain fluid-like properties, a simple theoretical expression for pressure transmission is derived. Comparison with data on Saran powders and granular polystyrenes shows good agreement between theory and experiment. The effect of lubrication is shown also.

The compaction of granular polystyrene follows the same pattern as that observed in the earth's crust. The porosity decreases exponentially with increasing pressure. The "compressibility coefficient" for the porosity of granular polystyrene is comparable with that given for clays and shales.

FEBRUARY 4 AT 2:00 P.M.—MELVIN MOONEY, PRESIDING

Mechanical Properties of Oriented Polystyrene Films. Lawrence E. Nielson and Rolf Buchdahl, Monsanto Chemical Co., St. Louis, Mo.

Cast films of polystyrene were oriented by stretching at temperatures above the softening temperature of the material and then cooled. A factorially designed experiment was carried out in which the amount of stretching, temperature of stretching, time held in the stretched state before cooling, and effect of several cycles of stretching before cooling were investigated as they effect the birefringence, the stress-strain properties, dynamic modulus and damping, and the softening temperature of polystyrene.

In general, the value of the stress-strain properties (modulus, elongation to break, and ultimate strength) in the direction of stretch, the dynamic modulus, and the birefringence all increase with an increase in the amount of stretching, a decrease in temperature, an increase in rate of cooling after stretching, and a decrease in the number of times the film was stretched before finally cooling. The values of many of the mechanical properties are more closely related to the birefringence than to the amount of hot stretching. The softening temperature is decreased in direct proportion to the birefringence. Annealed films give higher softening temperatures than films which have been stretched and then allowed to shrink before cooling.

The Transition Phenomenon of Polymeric Substances. R. Buchdahl, L. E. Nielson, R. E. Pollard, Monsanto.

The mechanical properties of high polymers are determined by the location of the transition range on the temperature scale; the transition region is defined as the temperature range where the mechanical loss factor goes through a maximum and where the dynamic elastic modulus changes by several decades. Below the transition temperature the polymer is a rigid brittle solid, and above this temperature the polymer is a rubber-like material. The addition of low molecular weight plasticizer to the polymer lowers the transition temperature and changes the width of the transition. Quantitative changes of the transition temperature will be explained in terms of plasticizer concentration, compatibility of the plasticizer-polymer system, and in terms of a transition in the plasticizer. For copolymers the transition range can be predicted from the volume of the two

[7] *J. Applied Phys.*, 20, 502 (1949).

components and their respective transition temperatures. The behavior of polymer blends in terms of the transition phenomenon is discussed briefly, and a possible interpretation of the general transition phenomenon will be given.

Dispersion of Dynamic Rigidity and Viscosity in Concentrated Polyvinyl Acetate Solutions. John D. Ferry, W. M. Sawyer, George V. Browning, Arthur H. Groth, Jr., University of Wisconsin, Madison, Wis.

Data for the dynamic mechanical properties of solutions of polyvinyl acetate in 1,2,3-trichloropropane, obtained from both transducer and wave propagation measurements, superpose for all concentrations from 5.0 to 40% and all temperatures from —3 to 41° C. when the reduced dynamic rigidity, $G'T_0/Tc$, and the reduced dynamic viscosity, η'/η, are plotted against the reduced frequency, $\omega\eta T_0/Tc$; G' = real part of complex dynamic rigidity, η' = real part of complex dynamic viscosity, η = steady flow viscosity, c = concentration in g./cc., T = absolute temperature, $T_0 = 298°$ K. This behavior can be predicted by postulating that each elastic mechanism has a rigidity proportional to T and to c and that the relaxation times of all mechanisms have the same dependence on c and T. The two universal dispersion curves are characteristic of a given polymer sample, representing the mechanical properties in a hypothetical standard state of unit density and unit viscosity at 298°K. From either dispersion curve the distribution of relaxation times may be obtained over about five cycles of logarithmic time. The distribution indicates a relatively sharp cutoff at the upper end which may be attributed to the finite molecular length of the linear polymer.

The Effect of Excluded Volume on the Configurations of Long-Chain Molecules. Jacob Riseman and Robert Ullman, Polytechnic Institute of Brooklyn.

The effect of excluded volume on the configurations of simple chains has been studied by carrying out random walks in a 3-dimensional tetrahedral lattice, using punched-card machines. Excluded volume was taken into account by comparison of coordinates of all steps in each walk and rejection of equals. The frequency and position along the chain of closure were noted.

On very general grounds it can be shown that the number of configurations of a chain of Z links with excluded volume is $F_1(Z) = \gamma^Z G(Z)$ where $G(Z)$ is no stronger than a polynomial. This suggests the definition of an effective coordination number

$$\gamma\ (Z) = \gamma G(Z)^{1/Z} = 3H(Z)$$
$$H(Z) = h_1(Z)h_2(Z) \ldots h_Z(Z).$$

The correlation numbers $h_n(Z)$ are the probabilities of the Z'th link surviving by not occupying the lattice point of the n'th link (counted from the end). It is shown that $h_n(Z)$ is independent of Z, for reasonably large Z, and that in the limit of large n, $h_n\ (Z) \to 1$. In general $h_n\ (Z) = h_n = \exp(-\frac{1}{4}n^2)$. This gives a value of the limiting coordination number of 2.86 and also affords a distribution function of side groups on a polymer growing with unspecific chain transfer.

Concentration Dependence of Viscosity of Solutions of Macromolecules. Jacob Riseman and Robert Ullman.

The method of Kirkwood and Riseman, used to account for hydrodynamic interaction between elements of the same chain, is extended to include interactions between elements of different chains, responsible for the hydrodynamic effects leading to the concentration dependence of viscosity. The dumbbell and rod-shaped molecule will be treated. Smolochowski's result for pair interaction appears as a first-order approximation. The viscosity calculation is carried out by considering the average shearing stress across a plane and yields for the viscosity a generalized binomial form,

$$\eta = \eta_0/1 - f(c).$$

$f(c)$ depends on the distribution function of elements on the same and different chains. At low concentrations a uniform distribution has been assumed, leading to a $k'\ (\eta)^2$ as the coefficient of the c^2 term. A method of iteration would give $f(c)$ as an infinite power series in the concentration, and the corresponding viscosity as a doubly infinite power series. The generalized binomial form thus obtained therefore bears some resemblance to empirically proposed equations for the viscosity.

The Stress-Strain Behavior of Thermally Shortened Collagen Tendons. Norman W. Wiederhorn and Gerald V. Reardon, United Shoe Machinery Corp., Boston, Mass.

To gain information concerning the structure of collagen, the stress-strain behavior of thermally contracted (denatured) kangaroo tail tendon was studied. It has been determined that when this material is highly swollen with appropriate swelling agents, it obeys the kinetic theory of rubber elasticity for relatively large deformations. The material is apparently cross-linked by covalent linkages, and the average molecular weight of the chain between points of cross-linking has been determined to be 54,000 ±7,000. This corresponds to approximately 600 amino acid residues so that the concentration of amino acids involved in cross-links is of the order of 0.2%.

Molecular Weights from Flow Birefringence and Intrinsic Viscosities. M. D. Schoenberg and F. R. Eirich, Polytechnic Institute of Brooklyn.

An empirical relationship is proposed relating the quotient $(n_e\text{-}n_0)/q\eta_0 C$ to the molecular weight and intrinsic viscosity. The constant obtained for a single fraction in a given solvent from experimental flow birefringence and intrinsic viscosity data, when applied to flow birefringence and intrinsic viscosity measurements on other fractions of the same polymer in the same solvent, gives molecular weights that are in agreement with those obtained by other measurements. The molecular parameters b and ζ are obtained by calculating the rotatory diffusion constant of Riseman-Kirkwood.

At large gradients the above relationship no longer is applicable, which effect is attributed in part to a "stretching" phenomenon.

Rubber-to-Metal Adhesive

A NEW type of rubber-to-metal adhesive has been developed by Magic Chemical Co., Brockton 2, Mass. The new product may be used for fastening rubber products to any type of metal for service under either static or dynamic conditions, such as tank lining and belting repairs. It may also be used for other types of assembling operations where an adhesive is required. The new adhesive is formulated from a synthetic material made by the company and was developed to supplement the firm's line of coatings and primers for protection against corrosion and abrasion under severe service conditions.

Du Pont's Alamask Odorants

THE availability in commercial quantities of a new series of odorants for rubber and related products has been announced by E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. Sold under the trade name Alamask, the new odorants may be used singly or in combination, in concentrations from 0.1-0.01%, added during the manufacturing process. Introduction of the odorants marks the company's formal entry into the industrial aromatics business, although du Pont has long been a manufacturer of chemical scents. A year of formalized research at the company's aromatics laboratory at New Brunswick, N. J., supplemented by a testing program in the rubber laboratory, went into the development of the Alamasks. The new odorants may be used in foam rubber products; latex-bonded upholstery and rug-backing fibers to reodorize both rubber and fibers; rubber-containing adhesives; other types of rubber goods; and in certain plastics. Alamasks are available for use in both natural and synthetic rubbers, including neoprene.

Hycar OR-15 Aging Study

A LONG aging period has little effect on crude Hycar OR-15 rubber, according to a report by B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, O. Tests conducted by the company with samples of crude Hycar OR-15 manufactured nearly five years ago indicate that little or no property changes had occurred in that period in either the crude or vulcanizate forms. Although slightly darker in color than current Hycar OR-15 because of antioxidant discoloration, the five-year old sample handled and milled identically the same as the current product and showed no variation due to age. Identical formulations were employed in the vulcanizate tests, and compounds tested for modulus, tensile strength, elongation, and hardness after various curing cycles. Block specimens were also tested for hardness and compression set. Little or no differences in values were obtained in these tests between current and old Hycar OR-15, but the aged rubber showed a decrease in raw Mooney from 59 to 52 and a decrease in cement viscosity from 10,150 to 4,800 centipoises in the Brookfield viscosimeter.

General Tire Adhesive

KALABOND RM-2, a new adhesive for bonding a wide range of metals to different types of rubbers, has been announced by The General Tire & Rubber Co., Akron, O. The new adhesive, based on a tailor-made polymer, reacts with both metal surface and rubber during vulcanization to form a positive chemical bond. Kalabond RM-2 will bond natural, GR-S, nitrile, and neoprene rubbers to steel, stainless steel, aluminum, zinc, magnesium, brass, monel metal, and nickel. Other features of the new product include uniformity, stability, and ease of handling and application. The adhesive contains no halogen and has definite anti-corrosive properties. Bonds made from the new product are highly resistant to aging, solvents, oil, and boiling water.

Chemical Exposition Reports Heavy Buying

THE Twenty-Second Exposition of Chemical Industries, probably the most colorful and extensive show in the series, was held on November 28 to December 3 at Grand Central Palace, New York, N. Y. Exhibits by 412 companies, occupying four floors of the Palace, covered everything in the equipment line required to bring chemical laboratories or plants completely up to date.

Exhibitors reported a firm demand for all types of equipment, particularly for materials handling, power plant, mixing and grading, and drying equipment. Purchases by foreign chemical industries, well represented among the reported attendance of more than 46,000 persons, were made in record quantities, with demand concentrated on mixing, handling, and power equipment. A noteworthy feature of the Exposition was the numerous exhibitors who announced their readiness to develop new appliances for investigation, new machinery for advance lines of manufacture, and even design and build whole new chemical plants.

Chemical Exhibits

In addition to full lines of resin and latex emulsions and dispersions, American Resinous Chemicals Corp. featured a new series of hot-melt concentrates of Butyl rubber and polyethylene for use as additives for adhesives, waxes, and other compounds. Exhibits featuring plasticizers and solvents were shown by Carbide & Carbon Chemicals Corp., Commercial Solvents Corp., and Socony-Vacuum Oil Co. Resins, asphaltic compounds, and organic chemicals were displayed by Koppers Co., Inc., while Union Carbide & Carbon Co. featured resins and plastics and their applications in the chemical processing industry.

Extensive lines of fatty acids and their derivatives were exhibited by Emery Industries, Inc.

An interesting display of its services as consultants was shown by Foster D. Snell, Inc., including many new chemicals and compounds developed as a result of such work. In the inorganic materials field, lines of fillers and insulation materials were shown by Dicalite Co., Eagle-Picher Sales Co., and Johns-Manville Sales Corp.

Equipment Exhibits

Rubber companies were prominent among the equipment exhibitors, with hard rubber piping, valves, acid handling, and other processing equipment displayed by American Hard Rubber Co., Conneaut Rubber & Plastics Corp., and Luzerne Rubber Co.; while an extensive line of rubber and rubber coated industrial gloves was shown by Pioneer Rubber Co. Rubber packings for all types of service were featured by Garlock Packing Co. Mixing equipment was much in evidence; among the exhibitors were Baker Perkins, Inc., Bramley Machinery Co., and Mixing Equipment Co. Grinders and pulverizers were displayed by many firms, including Pulverizing Machinery Co., Read Machinery Division of Standard Stoker Co., Link-Belt Co., and Sturtevant Mill Co.

Steam boilers, both plant and package types, were shown by Combustion Engineering-Superheater, Inc., and a Dowtherm heating system applicable to molding and injection presses was exhibited by Eclipse Fuel Engineering Co. Many displays of feeding and conveying systems were noted at the Exposition, with exhibitors including Allis-Chalmers Mfg. Co., Jeffrey Mfg. Co., B. F. Gump Co., and others. Displays of industrial drying equipment were shown by L. O. Koven & Bros., Inc., and Proctor & Schwartz, Inc. Among the other exhibits of special interest were the laboratory molding presses of Fred S. Carver, Inc.; the magnetic separators displayed by Eriez Mfg. Co.; the automatic weighing and batching equipment from Exact Weight Scale Co. and Richardson Scale Co.; the chemically resistant processing equipment displayed by U. S. Stoneware Co., National Lead Co., and Haveg Corp.; and the industrial cables shown by John A. Roebling's Sons Co. Instrument companies were also prominent at the Exposition, and much interest was shown in the exhibits of American Instrument Co., Bailey Meter Co., Brabender Corp., Brown Instruments Division of Minneapolis-Honeywell Regulator Co., Cambridge Instrument Co., Inc., and General Electric Co.

Smith Discusses Silastic

APPROXIMATELY 130 members and guests of the Rhode Island Rubber Club attended a dinner-meeting on November 17 at Metacomet Golf Club, East Providence. Speaker of the evening was Earle J. Smith, Dow Corning Corp., who discussed "Silicone Materials, with Emphasis on Silastic."

Mr. Smith stated that during the past year three new techniques have been developed for improving certain properties of Silastic without sacrifice of other desirable qualities, and an entirely new stock has also been developed. The three improved stocks follow: (1) a series of stocks serviceable over a temperature of —150 to 500° F., developed to meet the military demand for a rubber that will remain flexible indefinitely at temperatures between —70 and —100° F.; (2) a series of stocks whose compression set values have been reduced to about one-third of the best values previously obtainable, and intended for high-temperature gasket and O-ring use; and (3) a limited number of stocks that are self-extinguishing and were developed for use in applications involving a fire hazard.

The new Silastic stock, Mr. Smith said, has two to six times the mechanical strength of any silicone rubber previously available. This stock, identified as Silastic 250, also has improved dielectric properties and excellent low-temperature characteristics. The outstanding properties of Silastic 250 permit its use in many applications where previous Silastic stocks were unsatisfactory because of low mechanical strength.

Elections of officers and directors of the group for the coming year took place at the business session. The new officers and directors, selected by the nominating committee and unanimously elected, are as follows: chairman, Frederick S. Bartlett, United States Rubber Co.; vice chairman, Frederick V. Newman, Respro, Inc.; secretary-treasurer, C. Leigh Kingsford, Davol Rubber Co.; and directors, (*three years*) Urbain J. H. Malo, Crescent Co., Inc., and Harry Ebert, Firestone Rubber & Latex Products Co., (*two years*) Francis W. Burger, Kleistone Rubber Co., Inc., and W. Kenneth Priestly, U. S. Rubber, and (*one year*) R. G. Volkman, U. S. Rubber, and Gilbert E. Enser, Collyer Insulated Wire Co., Inc.

Groups Hold Christmas Parties

THE largest and one of the best Christmas parties in the history of Detroit Rubber & Plastics Group, Inc., took place on December 9 at the Detroit Leland Hotel, Detroit, Mich. A record attendance of 350 members and guests were present at the affair, which included a cocktail hour, dinner, an excellent program of vaudeville entertainment, and a drawing for more than 150 door prizes donated by some 106 rubber and supplier companies.

The annual election of officers was held after the dinner with the following results: chairman, G. M. Wolf, Sharples Chemicals, Inc.; vice chairman, G. T. Lindner, Minnesota Mining & Mfg. Co.; secretary, E. V. Hindle, United States Rubber Co; assistant secretary, Walter Bauer, Brown Rubber Co.; treasurer, E. J. Kvet, Baldwin Rubber Co.; assistant treasurer, J. C. Dudley, Chrysler Corp.; and counselors, W. B. Davies, Kaiser-Frazer Corp., and J. B. Wilson, Ford Motor Co.

The appointment of the following committees was also announced: program, G. R. Cuthbertson, U. S. Rubber, chairman, and W. J. Simpson, Chrysler Corp.; entertainment, T. W. Halloran, Chemical Products, Inc., chairman, and H. W. Neale, Pioneer Latex & Chemical Co.; and publicity, G. P. Hollingsworth, Minnesota Mining, chairman, and J. T. O'Reilly, Ford.

New York Group Party Attracts 450

The New York Rubber Group held its annual Christmas party on December 16 at the Henry Hudson Hotel, New York, N. Y. Approximately 450 members attended the affair, which began with a cocktail party at 5:30 p.m., followed by a dinner at 7:00 p.m. After dinner came a short business session at which new officers and directors of the Group were elected. A program of entertainment followed, consisting of several vaudeville acts and featuring rather active although unsolicited participation by the audience. The evening concluded with a drawing for 123 valuable prizes made available by contributions of 78 rubber and supplier companies.

At the business session a slate of officer and director candidates was presented by the nominating committee under the chairmanship of M. R. Buffington, Lea Fabrics, Inc., assisted by Harry Outcault, St. Joseph Lead Co., Joseph E. Waters, General Cable Corp., and Frank S. Malm, Bell Telephone Laboratories, Inc. These candidates, who were then elected unanimously, are: chairman, D. E. Jones, American Hard Rubber Co.; vice chairman, Howard Ling, Naugatuck Chemical Division, United States Rubber Co.; secretary-treasurer, Peter P. Pinto, *Rubber Age;* sergeant-at-arms, T. F. Callahan, Witco Chemical Co.; and directors for three-year terms, Sherman R. Doner, Manhattan Rubber Division, Raybestos-Manhattan, Inc., William Lamela, Okonite Co., R. H. Cubberley, Flintkote Co., and William S. Rea, United Carbon Co. Retiring Chairman Peter P. Murawski, E. I. du Pont de Nemours & Co., Inc., and Retiring Secretary-Treasurer B. B. Wilson, India RUBBER WORLD, become *ex-officio* members of the executive committee.

SORG Celebrates

The Southern Ohio Rubber Group held its annual Christmas Party on December 10 at the Miami Valley Golf Club, Dayton, with 212 members and their wives attending. Music by the Harshbarger Trio

was provided during the dinner, followed by the distribution of favors and door prizes. Each lady present received a La-Cross Cuticle Set, and more than 40 door prizes were awarded to lucky ticket-holders through the contributions of some 62 rubber and supplier companies. The party concluded with dancing and card games.

In accordance with previously stated plans, the Group has published the first issue of its newspaper. Temporarily titled "?????——" the issue, dated December, 1949, features the details of a "You-Name-It" contest to find a suitable name for the publication. The issue also includes news notes, a report on the Group's previous meeting, and brief biographies of some of the officers.

Buffalo Group Elects Officers at Celebration

The Buffalo Rubber Group held a highly successful Christmas party on December 13 at the Hotel Westbrook, Buffalo, N. Y., with 133 members and guests attending. A program of entertainment was provided, and there was a drawing for door prizes, with everyone present receiving a prize through the courtesy of contributions by some 90 rubber and supplier companies.

The election of Group officers and directors for the coming year took place with the following results: chairman, John G. Augenstein, U. S. Rubber Reclaiming Co.; vice chairman, Paul H. Tufts, Barrett Division, Allied Chemical & Dye Corp.; and secretary-treasurer, Oren A. Ferster, Queen City Rubber Co., Inc. Directors elected were: three years, Charles O. Miserantino, Dunlop Tire & Rubber Corp., and Fred Kohlhagen, Globe Woven Belting Co.; two years, Walter Lex, Hewitt-Robins, Inc., and Russell Schutz, U. S. Rubber Reclaiming; and one year, Paul Sick, Hewitt-Robins, and Burt Wetherbee, Wetherbee Chemical Co.

Ladies Guests at Chicago Party

One of the most successful parties in the history of the Chicago Rubber Group was held December 16 at the Morrison Hotel, Chicago, Ill. More than 700 members, their wives, and guests attended the party, which included a cocktail hour, turkey dinner, two-hour floor show of night-club acts, and an evening of dancing. Each lady present was given a compact with the compliments of the Group.

Much of the credit for the success of the affair should go to the arrangements committee under the chairmanship of J. C. Gallagher, Allis Rubber Co., and assisted by R. L. Campbell, New Jersey Zinc Sales Co.; E. D. Ekkebus, Allis Rubber; F. S. Frost, Frost Rubber Works; E. H. Grossman, Tumpeer Chemical Co.; R. K. Opper, Naugatuck Chemical Division, United States Rubber Co.; W. H. Peterson, Enjay Co.; J. P. Sheridan, N. J. Zinc Sales; J. F. Taylor, Commercial Solvents Corp.; and C. E. Wonder, Van Cleef Bros. The officers and committeemen expressed appreciation for the contributions to the party from more than 120 rubber and supplier companies.

Rubber Division Spring Meeting

THE fifty-sixth meeting of the Division of Rubber Chemistry, A.C.S., will be held in conjunction with the one hundred seventeenth meeting of the Society at Detroit, Mich. Division meetings will be held from Wednesday, April 19, to April 21, 1950, and headquarters will be at the Book Cadillac Hotel. The first session will start at 2:00 p.m. on Wednesday afternoon, with F. W. Stavely, Firestone Tire & Rubber Co., chairman of the Division, presiding.

A letter, dated December 2, to members of the Rubber Division by C. R. Haynes, Binney & Smith Co., secretary of the Division, points out that at this meeting the officers would like to stress papers pertaining to processing and rubber technology. All that is necessary is for authors to send to the Division Secretary before January 24 an abstract of about 400 words, in triplicate, describing the research in sufficient detail so that members of the Division may be able to prepare themselves for an intelligent discussion of the paper at its presentation. Authors should include with the abstract their business connection, the laboratory in which the work was done, the name of the individual who will deliver the paper, and how much time is desired for its presentation. The author or one of the co-authors must be a member of the American Chemical Society. Three copies of the completed manuscript should be available for the Secretary at the time of the meeting.

The local committee on arrangements for this meeting is headed by George W. Wolf, Sharples Chemicals, Inc., with other members of this committee and their respective responsibilities as follows: John Dudley, Chrysler Corp., banquet; G. F. Lindner, Minnesota Mining & Mfg. Co., registration; G. R. Cuthbertson, United States Rubber Co., finance; John T. Davies, U. S. Rubber, meeting rooms; E. J. Kvet, Baldwin Rubber Co., 25-Year Club; and R. J. Shroyer, R. T. Vanderbilt Co., plant trips.

The luncheon meeting of the 25-Year Club will be held in the Italian Garden of the Book-Cadillac at noon Wednesday, April 19. There will be a banquet and entertainment for the Division at the Book-Cadillac on Thursday evening at 7:00 p.m.

Hotel reservation cards will be sent members at a later date.

IRI One-Day Conference on Rubber Properties

THE London Section of the Institution of the Rubber Industry plans a one-day conference on the behavior and testing of rubber under dynamic conditions, to be held in London, England, March 17. A program of six papers by experts in the rubber industry and in rubber research establishments has been arranged for, and it is hoped that these, together with others which may be contributed, will serve as a basis for a general discussion on the use of rubber in engineering applications, according to C. Falconer Flint, vice chairman of the London Section.

Preprints will be circulated before the meeting to those who require them, and a charge of 4s.6d. will be made for the complete set. It is planned that the proceedings of the conference will subsequently be published in a special issue of the *Transactions of the Institution of the Rubber Industry*.

An invitation is extended to all interested in this subject, but to facilitate the completion of arrangements those wishing to attend the conference are requested to write the Institution at 12, Whitehall, London, S.W.1., England, stating whether they wish preprints and other accommodations.

Tapp on Polymer Developments

A TALK on "Recent Polymer Developments," by J. S. Tapp, Polymer Corp., Ltd., featured the December 8 dinner-meeting of the Ontario Rubber Section, C.I.C. The meeting, held jointly with the Wellington-Waterloo Section, C.I.C., took place at Golden Lion Restaurant, Kitchener, Ont., and was attended by 120 members and guests of both groups.

Dr. Tapp's talk was a chemical discussion of the manufacture of "cold rubber" and methods used to produce finished compounds having a majority of straight-line polymers with as little cross-linked polymers as possible. The speaker also described recent work on the relation between chemical structure and physical properties of rubbers.

Symposium on Rubber Machinery

THE largest attendance in the history of the Akron Rubber Group is expected at a symposium on "Developments in Rubber Processing Machinery," to be held on February 3 at the Hotel Mayflower, Akron, O. Principal speakers will be Donald A. Comes, assistant general sales manager, Farrel-Birmingham Co., who will discuss new developments in mixing equipment, and Allen L. Heston, vice president, National Rubber Machinery Co., who will speak on extruder developments.

In addition to these speakers, questions on rubber machinery will be answered by a panel consisting of George C. Bruggemeier, Firestone Tire & Rubber Co.; Paul Beebe, Goodyear Tire & Rubber Co.; A. W. Phillips, General Tire & Rubber Co.; and Robert H. Wattleworth, The B. F. Goodrich Co. The afternoon symposium will start at 3:00 p.m. and be followed by a social hour and dinner. The after-dinner speaker will be a national figure in the sports world.

Nominate New Officers

THE report of the nominating committee for 1950 officers and directors featured the December 1 dinner-meeting of the Northern California Rubber Group. Approximately 40 members and guests attended the affair, held in Angelo's Restaurant, Oakland, and heard Joseph Hollister, Mare Island Naval Shipyard, speak on "The Pitfalls and Pratfalls of Rubber Testing," and Lieutenant Beck, Air Force Air Rescue Service, describe "The Story of the Air Rescue Service."

The following were nominated as candidates for office: chairman: Fred Swain, Pioneer Rubber Mills, and Irving Seegman, Alameda Naval Air Station; vice chairman, Neil McIntyre, Oliver Tire & Rubber Co., and Robert James, Mare Island; secretary, John Mason, Pioneer, and James Sanford, American Rubber Mfg. Co.; treasurer, Grover Ramsey, Grove Regulator Co., and Leonard Hohl, American Rubber; and directors, Edward Coxhead, Goodyear Rubber Co., John McSparan, C. P. Hall Co., Rolf Hassarud, Niagara Chemical Co., Mr. Hollister, Stanley Mason, Pioneer Rubber, and Robert Henderson, American Rubber. Outgoing Chairman Don Good, American Rubber, will also serve as a director during 1950.

R. A. Schatzel

Goggin Succeeds DuBois, Schatzel Replaces Kemp In Editorial Advisory Board

R. A. SCHATZEL, vice president and director of engineering of Rome Cable Corp., replaces A. R. Kemp, formerly of Bell Telephone Laboratories, on the Editorial Advisory Board of India RUBBER WORLD for the year 1950. Mr. Kemp resigned from the Board because of his retirement from the Bell Laboratories several months ago, his moving to the West Coast, and his doubts regarding his easy availability, and his resignation was accepted with regret.

Mr. Schatzel, who has bachelor's and master's degrees in science from Union College, is very well known in the rubber and plastics industries, particularly in the wire and cable fields. He was assistant research director of Rome Cable in the early 1920's and technical director and then director of research of General Cable Corp. from 1926 to 1945. In 1945 he returned to Rome Cable as vice president and director of engineering.

Mr. Schatzel has many publications and patents in the wire and cable field to his credit and was active both prior to and during the war as an adviser to the OPM and then as chairman of the technical consulting committee for rubber insulated wire and cable of the Office of the Rubber Director. He has continued in this capacity and is still chairman of the committee for the Rubber Division, United States Department of Commerce.

The new Advisory Board member is also a member of the American Chemical Society, A.S.T.M., A.I.E.E., A.I.M. & M. E., Sigma Xi, and a fellow of the American Institute of Chemists.

Mr. Schatzel will advise the editor of India RUBBER WORLD in the field of wire and cable.

William C. Goggin, manager, plastics technical service, Dow Chemical Co., Midland, Mich., replaces John H. DuBois, Shaw Insulator Co., on the Board for 1950. Mr. DuBois found it necessary to resign because of the pressure of his regular activities.

Mr. Goggin is a graduate of Alma College and the University of Michigan. He holds an M.S. degree in electrical engineering from the latter institution. He has been associated with the Dow company since 1936, first in the physical research laboratory and then in various sales and technical service capacities for Dow's plastic materials.

In 1945, Mr. Goggin served as a technical consultant to the War Department, Quartermaster Corps, investigating the German plastics industry. As a result of this work, he is a co-author with J. M. DeBell and W. E. Gloor of the book, "German Plastics Practice," published with the permission of the Department of Commerce.

Mr. Goggin, furthermore, is a member of many professional and scientific societies including the A. C. S., Society of the Plastics Industry, Society of the Plastics Engineers, and A.S.T.M., and is technical representative to the Plastic Materials Manufacturers Association.

He will advise your editor on matters relating to plastics and plastics processing.

CALENDAR

Jan.	16-19.	Plant Maintenance Show and Conference. Auditorium, Cleveland, O.
Jan.	16-31.	"March of Dimes."
Jan.	18.	South Texas Section, SPE.
Jan.	18.	American Society of Body Engineers, Inc. Annual Dinner-Meeting. Detroit Leland Hotel, Detroit, Mich.
Jan.	20.	Northern Indiana Section, SPE. Van Orman Hotel, Fort Wayne.
Jan.	22-26.	National Sporting Goods Association Convention and Show. Hotel Morrison, Chicago, Ill.
Jan.	24.	Washington Rubber Group.
Jan.	31.	Buffalo Rubber Group. Hotel Westbrook, Buffalo, N. Y.
Feb.	2-4.	American Physical Society. Annual Meeting, New York, N. Y.
Feb.	3.	Akron Rubber Group. Symposium on New Developments in Rubber Machinery. Mayflower Hotel, Akron, O.
Feb.	6.	Philadelphia Section, SPE.
Feb.	6-10.	Automotive Accessories Manufacturers of America. Twenty-Third Annual National Volume Buyers Exposition. Grand Central Palace, New York, N. Y.
Feb.	7.	The Los Angeles Rubber Group, Inc. Hotel Mayfair, Los Angeles, Calif.
Feb.	10.	Quebec Rubber & Plastics Group. Annual Ladies' Night. Town of Mt. Royal Community Hall, Montreal, P.Q., Canada.
Feb.	13.	Upper Midwest Section, SPE.
Feb.	15.	South Texas Section, SPE.
Feb.	17.	Chicago Rubber Group. Morrison Hotel, Chicago, Ill.
Feb.	17.	Northern Indiana Section, SPE. Van Orman Hotel, Fort Wayne.
Feb.	18-26.	National Sportsmen's Show. Grand Central Palace, New York, N. Y.
Feb.	24.	Detroit Rubber & Plastics Group. Spring Meeting.
Feb.	28.	Washington Rubber Group.
Mar.	2-4.	Pacific Coast Section, SPI. Spring Conference. Hotel Del Coronado, near San Diego, Calif.
Mar.	6.	Philadelphia Section, SPE.
Mar.	7.	The Los Angeles Rubber Group, Inc. Hotel Mayfair, Los Angeles, Calif.
Mar.	13.	Upper Midwest Section, SPE.
Mar.	13-15.	National Association of Waste Material Dealers, Inc. Thirty-Seventh Annual Convention. Waldorf-Astoria Hotel, New York, N. Y.
Mar.	15.	South Texas Section, SPE.
Mar.	17.	Boston Rubber Group. Spring Meeting. Somerset Hotel, Boston, Mass.
Mar.	17.	Northern Indiana Section, SPE. Van Orman Hotel, Fort Wayne, Ind.
Mar.	23.	Quebec Rubber & Plastics Group. Canadian Legion Hall, Montreal, P.Q., Canada.
Mar.	24.	Chicago Rubber Group. Morrison Hotel, Chicago, Ill.
Mar.	28.	Washington Rubber Group.
Mar.	28-31.	National Plastics Exposition. Navy Pier, Chicago, Ill.
Mar.	31.	Akron Rubber Group. Spring Meeting. Mayflower Hotel, Akron, O.
Apr.	3.	Philadelphia Section, SPE.
Apr.	4.	The Los Angeles Rubber Group, Hotel Mayfair, Los Angeles, Calif.

William C. Goggin

Quebec Group Meets

FORTY-FOUR members and guests of the Quebec Rubber & Plastics Group attended a regular dinner-meeting on November 24 at Canadian Legion Hall, Montreal, P.Q., Canada. Guest speaker was P. C. Armstrong, consulting economist, Canadian Pacific Railways, who discussed "The Rebuilding of International Trade."

Mr. Armstrong traced the growth of the Canadian economy and discussed the effect of modern mass production, transportation, and communications on this economy. Turning to the international scene, the speaker said that until 1914 there was a free exchange of goods between nations and a basis for a common world currency, the pound sterling. After 1918, England was unable to hold her position and had to go off the gold standard. The United States, the only nation capable of carrying on and establishing a common basis for international currency, refused to take the responsibility and retreated into a policy of isolationism. The present U. S. dollar is not considered stable enough to use as a common basis for international trade, but this nation could obtain such a basis by going back to the gold standard.

The speaker stated that alleviation of present world conditions from the monetary point of view will depend on the establishment of a common world currency

(*Continued on page* 458)

RUBBER WORLD
NEWS of the MONTH

Business at about 1949 Level Predicted for 1950; Further Expansion of Rubber and Plastics Uses Considered Possible

Year-end statements of business leaders in the rubber and in the plastics and associated industries were again optimistic for continuation of the present level of business activity through 1950 and, with certain reservations due to possible unfavorable international and domestic trends, for further expansion of the fields of use of rubber and plastics raw materials. Tire and tube sales were expected to be somewhat higher in 1950 than in 1949, and mechanical rubber goods sales at least at the 1949 level if activity in the automobile, refrigerator, washing machine, radio, and other similar industries continued strong.

Some improvement in natural rubber quality and packaging, a continuing postwar difficulty to rubber goods manufacturers, is expected during the year. Sharp increases in the consumption of natural and synthetic rubber latices are expected to continue as latex foam sponge production is increased.

Consumption of plastics raw materials is also expected to increase further in 1950 as the use of many plastics products in the television and radio, upholstery and house furnishings fields indicate the possibility of further expansion this year.

In the rubber industry negotiations on pension and insurance plans between management and the URWA are expected to be completed during the first part of 1950.

Hearings before the Federal Trade Commission on the proposed 20,000-pound limit above which tire manufacturers may not grant discounts to their customers will take place in January and February; hearings on the new rubber legislation should get under way during the first quarter of 1950, and the fight for reduced tire and tube excise taxes by the tire and tube manufacturing industry should also take place early this year.

Executives' Year-End Statements

The American tire industry can expect a 5% increase in 1950 in passenger-car replacement sales, according to John L. Collyer, president of The B. F. Goodrich Co., in his year-end statement. The replacement of worn-out tires on the millions of automobiles produced in 1946, 1947, and 1948 should be a major factor in this increase.

Sales of replacement truck tires will exceed 7,000,000 units, an increase of 4%, Mr. Collyer said; while 5% greater sales of replacement tires for agricultural use is anticipated in 1950.

It was pointed out that tire prices have been uneconomically low for some time and that despite recent small price increases, the 6.00 by 16 four-ply tire still costs consumers less than it did a year ago and only 2% more than in 1939. Mr. Collyer said this fact is especially enlightening since production costs have increased greatly, and the present-day tire is a heavier, more serviceable product.

The demand for rubber products continues strong on all fronts, and industry-wide consumption of rubber will be about 935,000 long tons in 1950, as compared with the approximately 975,000 tons consumed in 1949.

Recovery from the effects of the recent war can be gaged in part by the volume of rubber being consumed throughout the rest of the world, it was added. Consumption outside the United States increased from 831,000 long tons in 1948 to an estimated 893,000 tons in 1949. The gain is expected to continue in 1950 with an estimated 920,000 tons being consumed by the rest of the world.

The mid-century year—1950—again will see expansion in the chemical and plastics fields, Mr. Collyer added. An estimated 190,000,000 pounds of polyvinyl plastics were manufactured in this country in 1949, a portion of which has been made into industrial and consumer products once manufactured exclusively from rubber. The automobile industry is using vinyl plastics in increasing volume for seat upholstery, kick pads, fender welting, door lock knobs, and other applications.

The Goodrich company, anticipating a continued high level of activity in conveyer belting, is constructing the most modern belt plant in the world. The $5,000,000 installation will have the largest belt vulcanizing press ever built.

"Research and development continue to be among the most important factors in the rubber industry," Mr. Collyer concluded. "Our research not only points toward new and better products but also seeks out new uses for existing ones."

Harry E. Humphreys, Jr., president of United States Rubber Co., in his year-end statement predicted that the rubber industry should enjoy good business in 1950, with sales totaling about the same as in 1949—close to $3 billion.

Tire sales for 1950 are estimated at 80,000,000 units, about equal to the 1949 total. It is possible that original equipment business might fall off some, but replacement sales should hold up well. Improvement is expected in the sale of both waterproof and canvas footwear in 1950 because this section of the industry will benefit from the increased population of the country and the growing tendency to more leisure and outdoor living which calls for the wearing of more sport and casual footwear, Mr. Humphreys said.

Industrial rubber products, including hose, belting, packing and vibration-dampening devices, will be in strong demand in 1950 in line with the general high level of business. Foam rubber production will be expanded further to meet the growing demand for foam bedding and cushioning for furniture and automobiles.

Rubber consumption in the United States in 1950 was estimated at about the same tonnage as used in 1949, 575,000 long tons of natural and 410,000 tons of synthetic.

Rubber is the only major manufacturing industry still under wartime controls, it was pointed out. The industry is required by the government to consume synthetic rubber at the minimum annual rate of 222,000 tons. The industry has, however, used more synthetic rubber than required by law, every year since the end of the late war.

U. S. Rubber takes the position that the government should get out of the rubber business because the present controls are unnecessary and believes that the synthetic rubber industry will progress faster and operate more efficiently when freed of government regulation and turned over to private management, Mr. Humphreys concluded.

Harvey S. Firestone, Jr., chairman of the Firestone Tire & Rubber Co., in a statement at the end of December declared that rubber will continue to play a vital part in the advance of civilization during the next 50 years, just as it has in the past half century. The Firestone company is celebrating its fiftieth anniversary during 1950, and Mr. Firestone reviewed the position of the rubber industry in 1900 as compared with the present day and termed what happened in the rubber industry during the ensuing 50 years as "one of the most interesting and spectacular chapters in the saga of industrial progress under the American system of competitive free enterprise."

In recent years, the discovery and mass production of synthetic rubber played a vital part in winning World War II, Mr. Firestone stated. Technically speaking, synthetic rubber is a plastic, and anyone acquainted with the plastics industry ceases to be amazed at the new uses developed and predicted for this material. Who will deny that houses, automobile bodies, machinery may be made in whole or in part of plastics in the next half century? The future uses of synthetic rubber and other plastics appear to be limitless.

The next 50 years offer great opportunities for the growth of the rubber industry in the development and sale of rubber products for new uses other than tires, he added. New applications of rubber to insulate machinery and equipment from vibration and to absorb shocks indicate the prospect of a much enlarged market in this field. The next 50 years may bring rubber roads that will be more durable and less costly to maintain. In the future, foamed rubber may replace the coil spring in automobile seats, furniture, and mattresses. Many manufacturers already are changing over to foamed rubber cushioning materials as fast as Firestone is able to increase output of this product.

Present-day tire manufacturing equipment is highly efficient, yet we constantly are working on new and improved designs, always seeking to make our machines still more efficient, more economical, simpler to operate, safer, and more accurate, Mr. Firestone continued. Electronic vulcanization shows great promise. Indeed, 50 years from now a tire manufacturing plant may bear little resemblance to the modern tire plant of today.

"It is, of course, impossible to predict with any degree of accuracy many of the things that will actually happen in the rubber industry during the next 50 years; too many external factors, such as international affairs, general economic conditions and new scientific developments are involved. However, as we look back over the accomplishments of the past 50 years, we can be confident that progress during

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the next half century will be equally impressive," Mr. Firestone concluded.

J. P. Seiberling, president of the Seiberling Rubber Co., in his year-end statement said he was optimistic about the tire business in 1950. He expects passenger tire replacement sales volume for the industry to be up 6-8% in the first half of the year, compared with 1949, and truck tire replacement sales 10 to 12% higher for the same period. Farm tire replacement sales, which were disappointing in 1949, should be up about 10%, and recapping ought to continue at its present high level, he added.

Too many factors are involved to try to predict the course of the second six months of 1950 now, Mr. Seiberling explained, but added that he felt confident that when the year is ended, the record of 1950 will show a distinct improvement over 1949 in sales volume and, barring an unforeseen economic decline, in profits as well.

As reasons for this belief, he gave the more aggressive selling of tire dealers, replacement demand of 1946-1948 passenger-car owners, greater mileage per vehicle at higher speeds, and the fact that the rising tire market is inducing motorists and truck owners to purchase in advance of their needs in order to avoid even higher prices.

RMA Statement

The Rubber Manufacturers Association, Inc., in its year-end statement, said that the rubber goods manufacturing industry in concluding a year which saw high levels of production maintained in virtually all lines of its products, estimates that the first-quarter 1950 output will hold to or exceed present volume and that, barring new unforeseen downturns in the general business picture, 1950 performance should at least equal that of 1949.

The industry consumed an estimated 980,000 long tons of new rubber in 1949, as compared with 1,069,000 tons in 1948; synthetic rubber use, at 410,000 tons, was proportionally higher than it was in 1948. The proportion of natural rubber consumed, 570,000 long tons, was relatively less than in 1948 in spite of substantial price advantages.

Production of passenger-car tires in 1949 reached 65,500,000 units, as compared with 66,700,000 units in 1948; while truck and bus tire production at 11,050,000 units was quite a bit less than the 14,575,000 units produced in 1948. In the agricultural tire field, production and sales held at approximately 1948 levels. Camelback sales were 20% ahead of 1948 figures.

Shipments of rubber heels and rubber and composition soling and other soling to shoe factories as original equipment on new shoes were slightly ahead of those of the previous year. In the field of shoe repairing, the takings of heels, soles, and soling materials by jobbers equaled those of 1948.

In the field of mechanical rubber goods, the volume trends in the heavier types of business reflected to a marked degree the general business activity of the country as shown by the Federal Reserve Board's Index of Production. Other branches of the mechanical rubber goods business have resumed their seasonal pattern, and although there was a steady decline in bookings from the beginning of the year until July, there has been a noticeable upward trend since that time so that the volume for the year, although below that of 1948, has been satisfactory on the average. Business in 1950 is expected to be at about the 1949 level.

Molded and extruded rubber goods, as well as chemically blown sponge rubber products are dependent, to a considerable extent, upon the automotive, refrigerator, washing machine, radio, and other similar industries. During the past year a high rate of volume has been experienced, and most manufacturers in this field feel quite optimistic with respect to 1950.

Rubber footwear manufacturers' production and sales during 1949 were well above prewar averages, even though the volume was below the record peaks reached during the past three years.

Rubber flooring has continued its postwar trend, with the volume in 1949 at a higher level than in the previous year.

The volume of business in coated fabrics was about equal to that in 1948. Production in the second half was above that of the same period in 1948, and prospects are that this volume will be maintained at least through the first half of 1950, the Association said.

One of the sensational developments of the year has been the sharp increase in the consumption of natural liquid latex, which reached a level of 31,191 long tons, dry weight, in the first 10 months of 1949, surpassing the full year's consumption of 1948 of 28,489 tons. Consumption of synthetic rubber latices also advanced steadily throughout 1949.

Last year collective bargaining negotiations in the rubber industry were largely centered around welfare plans such as pensions and group insurance. In a few cases agreements were reached regarding these issues, but in most instances the negotiations will carry forward into 1950 before any final settlements are made. During the early part of 1949 a few companies entered into agreements calling for wage increases of approximately 5¢ an hour, but the major portion of the industry did not grant any wage increases this past year.

Principal raw material problem of the industry in 1949 related to the quality of natural rubber imports. There was an improvement in ribbed smoked sheets, but in the lower grades, particularly those used in substantial quantity, quality was generally poor, seldom uniform. Complaints dealt also with poor packing and the frequent absence of grade markings on bales, a breach in direct violation of packing specifications.

Little progress was made by either manufacturers or American rubber dealers in their effort, undertaken when the war ended, to duplicate 1938 standards as represented in RMA type samples adopted in that year. As a matter of fact, Malayan shipments through the past year have been so lacking in uniformity that it has proved impossible to draw suitable samples even from individual bales, it was said.

Plastics Industry Statement

The Society of the Plastics Industry through Horace Gooch, Jr., president, said in its statement that at the turn of the year consumption of plastics products is continuing its upward swing after reaching a nine-month low last July. Latest available figures indicate that the current rate of consumption of plastics raw materials is equivalent to or slightly higher than the monthly average of a year ago.

While the consumption of molded plastic products during 1949 shows a decrease of approximately 10% from that of the previous year, continuing activity in the vinyl, polyethylene, and polystyrene fields particularly, will bring the year's consumption of all plastics products slightly above that of 1948, it was said. Bottlenecks in the supply of plastics raw materials have been eliminated, in the main, as increased manufacturing facilities have been completed.

Fields in which plastics products already indicate further expansion in 1950 cover television and radio, for much larger molded parts; upholstery and house furnishings, for furniture coverings, draperies, tablecloths, window and shower curtains, for refrigerator dishes and bowls; restaurant and institutional fields; for tableware, seat coverings, wall panels, and table tops.

Plastics in the packaging field at present know no bounds; bottles, bags, and boxes for all sorts of uses are being made out of plastics materials to carry many types of goods to market. The weaving of vinylidene chloride, an extruded monofilament or plastic thread, is continuing to expand.

In 1950 automotive manufacturers will be using more plastics products in their cars, according to a recent survey. Refrigerator manufacturers will be doing likewise.

The number of injection and compression molders and extruders of plastics materials currently operating in the United States is estimated at 1,300 companies; fabricators of sheet rod and tube, approximately 1,500 firms, fabricators of film and sheeting run into the hundreds, and manufacturers of raw materials total approximately 30 companies. Employment in the entire plastics industry is estimated at 100,000 persons.

Mention was also made of the rapid expansion of the vinyl sheeting and film field and the increasing use of plastics in the building and construction trades.

Even though the first plastic raw material was discovered in 1868, just three years after the Civil War, accelerated growth in the industry took place only within the last 10 years. In 1939 the production of synthetic resins totaled 213,027,548 pounds, as compared with the 1950 estimate of more than 1,500,000,000 pounds. Products made from plastics materials in 1950 will continue to increase, and their value, it is estimated, will approximate $1,000,000,000, the SPI statement said in conclusion.

Collyer on Rubber Quality

The announcement that British and French Far Eastern rubber growers would spend approximately $1,000,000 in the United States in 1950 to promote increased use of natural rubber, the money to be raised by an assessment on all rubber exported from Malaya, Ceylon, and Indo-China, caused Mr. Collyer to point out that with world production of natural rubber at 1,500,000 long tons a year and world demand for all types of new rubber at 1,900,000 long tons a year, every available pound of natural rubber is finding a market.

Mr. Collyer added that there is a wide scope in the natural rubber producing areas for improvement in the quality and uniformity of natural rubber and that greater efforts along these lines could be of more lasting benefit to natural rubber producers in promoting the use of their materials than an expenditure in the United States, which now consumes more than three times as much natural rubber as any other nation in the world.

The American rubber industry is annually expending tens of millions of dollars in research, development, and advertising to further the ever-increasing use of products made from natural and syn-

THE STORY BEHIND THE WORD...

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thetic rubbers in this country. The world average consumption per person in 1948, excluding the United States, was only about one pound. Estimated 1949 rubber consumption in the United States will be 14½ pounds per person. Every additional 1/10-pound per person use of rubber outside the United States would mean increased annual consumption of 100,000 long tons, Mr. Collyer added.

Lockwood in his December *Rubber Report* stated that recent discussions in Akron on the subject of rubber quality brought forth unsolicited, but vehement criticism of the rubber now being received from Malaya. This criticism was centered particularly about the lower grade sheets and Browns and Ambers, it was said.

The pending legislation on licensing of rubber packers and shippers may help, but the most practical way to improve the quality of these grades of natural rubbers is for the buyers to refuse to accept off-grades at a discount or on any other basis. The packers of the lower grade rubbers are simply too numerous and difficult to control to be expected to act voluntarily on such a matter, and Lockwood said that he honestly believed that if the Big Five rubber companies alone decided on the course of action based on rejection of improperly graded rubber, the difficulty would be eliminated in three months.

Lockwood on Rubber's Future

In the last issue of his monthly *Rubber Report* before taking over the direction of the Natural Rubber Bureau, W. S. Lockwood, stated that the first half of this century, in rubber, has been the golden era of the tire. Looking ahead, however, he said he was confident that the uses of rubber as a basic commodity in the next 50 years will expand beyond all present conception. Rubber roads, latex foam, rubber flooring, rubber in construction, rubber springs, rubber-based paints, and the like are on the threshold of a tremendous future.

Mr. Lockwood, in summarizing the outstanding impression of the last 20 years of the rubber industry, said that here is an industry which needs an injection of faith in itself, which needs to realize that 10 years of working together can produce far more results than the past 20 years of manufacturer, producer, and dealer pulling his own separate way.

The fierce competition of the leading manufacturers of rubber goods with each other is all to the good, but for 20 years manufacturers have missed a bet in not placing a reasonable portion of their promotion and advertising into a common fund to develop new uses of benefit to them all. Both manufacturer and producer have seemed too busy competing with other manufacturers and other producers, and with each other, to realize if all that energy had been diverted into new use development, then we can go out and push the horizons a long way back.

Remember, there are 10,000,000 miles of roads to be built and rebuilt; there are 500,000,000 natives needing rubber shoes; there are 1,000,000 pieces of furniture to be cushioned; there is the biggest housing program in history to be faced; there is a civilization to defend and a way of life —the free enterprise, *more*-work-for-more-pay, something for *something* way of life —to promote, Mr. Lockwood said in conclusion.

Business Trends, Etc.

The United States Commerce Department's "Industry Survey," dated November, 1949, stated that October sales in most manufacturing industries dropped below their September highs. This drop for the rubber goods industry was not so apparent on the "unadjusted basis" where a preliminary estimate of October sales was given as 265 millions of dollars, as contrasted with 269 millions of dollars for September. The Department's "seasonally adjusted" figures, however, were given as 277 millions of dollars for September and 244 millions of dollars for October.

United States exports of rubber and rubber products in October were valued at $8,218,371, compared with $7,933,946 in September and $10,823,292 in October, 1948, the Commerce Department reported on December 13.

October shipments of reclaimed rubber were the second highest this year, but shipments of scrap rubber were the lowest since January, 1946. Exports of synthetic rubber, valued at $314,617, were somewhat below recent levels, but exceeded the 1948 monthly average.

Among manufactured goods, shipments of mechanical rubber goods resumed their downward trend and were the lowest since October, 1945. Exports of truck and bus tires, at $3,552,425, were still below the January-June, 1949, average of $4,505,673. October exports of passenger-car tires were the highest since January, but exports of farm-tractor and implement tires and off-the-road tires continued to decline in October and were at their lowest levels this year.

The greatest drop in exports in 1949 has been in mechanical rubber goods. Exports of synthetic rubber registered the sizeable gain of 43.8% in the first 10 months of 1949. Exports of transportation goods represented 63.4% of the January-October, 1949, total, as against 59.9% in January-October, 1948.

Harold Von Thaden, vice president, Hewitt-Robins, Inc., speaking before the American Society of Mechanical Engineers in New York, N. Y., December 1, indicated the possibility of a considerable expansion of the use of rubber belting in relieving both passenger and cargo traffic in large cities such as New York. He suggested the replacement of the subway connection between Grand Central and Pennsylvania stations with moving sidewalks and the use of belt conveyers to move highway truck cargo from depots at the outskirts of the city to their destination within the downtown area. Loading and unloading of cargo ships at various seaports, increased movement of materials at mines, chemical, and food plants, etc., by belt conveyer systems were predicted. The speaker stated that long conveyer systems such as the proposed 130-mile belt system in Ohio were as inevitable as commercial air transportation was in 1920 and as atomic power for industry is today.

In this connection the Goodyear Tire & Rubber Co. recently announced the manufacture of the largest single conveyer belt to date for the Weirton Steel Co. This belt measured 10,900 feet in length and was constructed of rubber with steel and cotton cords. Total belting supplied by the company was about 22,000 feet.

In its regular monthly report on tire and tubes, the RMA stated on December 19 that shipments of passenger-car tires by manufacturers were off slightly in October to 5,784,685 units from the September level of 5,820,969, while shipments of truck and bus tires were substantially higher at 1,054,919 units, compared with 925,284 in the previous month.

Production of both passenger and truck and bus tires was considerably higher in October, partially owing to the termination of the September strike at the Goodrich company plants. Passenger-car tire production rose 13.5% to 5,621,182 units from 4,950,727 in September, and truck and bus tire production was up 34.6% to 878,835 units, compared with 653,014 the month before.

Passenger-car tire inventories on October 31 amounted to 7,015,899 units, almost a million less than a year ago. Truck and bus tire inventories were reported at 1,658,983, almost 8.5% lower than at the end of September and approximately 13% less than a year ago.

Automotive tube shipments were down about 5% during the month to 5,557,104 units from 5,842,812 in September; while production was up to 5,295,630 units, against 4,902,319 the previous month.

On December 27 the RMA stated that new rubber consumption for November, 1949, was down slightly to 83,153 long tons from 84,278 tons used in October. A total of 51,561 long tons of natural rubber was used during the month, as compared with 50,797 tons in October. Use of synthetic rubber declined 5.6% to 31,592 tons, as against 33,481 tons in October. The 11-month total of new rubber consumed was 903,666 tons, as against 992,310 tons in 1948, a decline of about 9%.

FTC Discount Hearings Postponed

The hearings before the Federal Trade Commission on the proposed 20,000-pound limit above which tire manufacturers may not grant discounts to their customers have been postponed at the request of the Big Four rubber companies until January 19 for filing written briefs and until February 7 for oral arguments.

The limitation first proposed by the FTC on October 4, 1949, had scheduled the hearing for November 18, but the companies requested an extension of time until December 19 and then another extension, which was granted. This second request was based on the contention that the Big Four as well as some of the smaller tire producers would have insufficient time to prepare their cases properly if the FTC went ahead with the hearings scheduled for December 19.

Labor News

Negotiations on pension and insurance plans continued during part of December between Goodyear, Firestone, and representatives of the United Rubber Workers, CIO, but were recessed before the holidays until after the first of the year. Negotiations between U. S. Rubber and the union were recessed on November 28, to be resumed on five days' notice after the company and/or the union had assembled necessary facts.

It was announced about December 1 that Gates Rubber Co. had signed an agreement with the URWA which provided a pension of $100 a month with Social Security benefits when an employe reached age 65 after 25 years of service with the company.

Other companies which have been talking pensions with the URWA include Hewitt-Robins, Republic Rubber, American Hard Rubber Co., Boston Woven Hose & Rubber Co., and Lee Tire & Rubber Co.

URWA Internal Dispute

Early in December it was announced that L. S. Buckmaster, president of the international URWA union, had dismissed the URWA director in Canada, Joseph MacKenzie, and three members of his staff for "unsatisfactory service." A new campaign to remove Mr. Buckmaster as

For INSULATED WIRE, GASKETS and STEAM HOSE

NEW ALBALITH-73

(THE WATER-REPELLENT LITHOPONE)

IMPARTS LOW WATER ABSORPTION

OFFICE OF RUBBER RESERVE *Test Method**		THE NEW JERSEY ZINC COMPANY *Test Method***					
		THICKNESS INCREASE (%) Hrs. in H_2O at 70°C.			VOLUME INCREASE (%) Hrs. in H_2O at 70°C.		
Pigment	WEIGHT INCREASE (Mg./Sq. Cm.)	300	500	1000	300	500	1000
XX-78 Zinc Oxide	2.49	2.04	3.02	5.74	4.88	6.60	12.52
Albalith-73	2.54	1.95	3.32	6.24	5.15	7.18	13.89
Albalith-11	3.10	2.41	3.76	7.42	6.64	9.00	16.77

COMPOUND

Smoked Sheet	100
Sulfur	3
D P G	1
XX-78 Zinc Oxide	5
Pigment	24 vol./100 vol. Rubber

Cure: 45 minutes @40 lbs.

*Test Method: Section D-3, Determination of Water Absorption, Specifications for Government Synthetic Rubber. Duplicate specimens (2" x 5" x 0.1") of each compound were immersed in water at 70°C. for 20 hours. The increase in weight per unit area represents the water absorption and is expressed in mg./sq. cm.

**This method is similar to the above. Specimens (2" x 2" x 0.1") are immersed in water at 70°C. for the hours shown, and the results are expressed as the increase in thickness and volume.

Albalith-73 is the outstanding lithopone for use in compounds that require low water absorption ... because it is specially processed, then coated with fatty acids.

Albalith-73, as shown above, imparts about 18% lower water absorption than a typical untreated lithopone.

Albalith-73, moreover, is similar in that feature to XX-78 Zinc Oxide—which for years has been favored for use in insulated wire and other compounds of low water absorption.

Albalith-73 also has good electrical properties, facilitates processing, and imparts high resilience, together with good tensiles and tear resistance.

Take advantage of Albalith-73 in your compounds for insulated wire, steam hose, gaskets and others.

HORSE HEAD PRODUCTS

THE NEW JERSEY ZINC COMPANY

Founded 1848

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president of the union was one of the results of the action. In a letter to the membership the opposition movement attacked the president and the general executive board for firing MacKenzie and other staff men "with complete disregard for their seniority."

It was stated that the letter was the first of a series to be sent to the union members in the United States and Canada in a drive to remove Buckmaster from the presidency at the union's next annual convention.

Although Mr. Buckmaster made no comment about his opponents' statements concerning the dismissals, in the union's monthly publication he referred to the opposition as "selfish politicians" and blamed these individuals for undermining the "honest people who represent the union."

EAST

Rinse Joins Centro Labs

Howard E. Smith, director of Centro Research Laboratories, Briarcliff, N. Y., on December 15 announced that Jacobus Rinse recently arrived to join Centro as associate director.

Dr. Rinse has served as chemical director of C.T.A.B. (Chemisch Technisch Aviesbureau), Haarlem, Holland, which he and Willem Dorst founded in 1938. The former will continue to act as co-director of C.T.A.B.; while Mr. Dorst remains in charge of the Dutch laboratory.

C.T.A.B., believed to be the largest private industrial research laboratory in Europe, has been outstanding in research and development of organic coatings, plastics, and raw materials.

Centro Research Laboratories and C.T.A.B. have for the past two years been associated in a number of research projects and exchange of information regarding European and American practices. Dr. Rinse's move to this country will facilitate collaboration between the laboratories which should prove of benefit to both American and European industry.

Dorothy Draper, Inc., has been retained by Comprehensive Fabrics, Inc., national distributer of Koroseal for the B. F. Goodrich Co., to style as well as to develop additional end uses for Koroseal fabrics, it was announced last month by Joseph A. Kaplan, president of Comprehensive fabrics. The Draper organization will work in cooperation with Comprehensive's stylist, Miss Jane Triolo, on the styling and development of Koroseal fabrics which are used for draperies, slipcovers, and furniture upholstery. These ready-made Koroseal items together with the yard goods are distributed through the Utilitex Corp., 350 Fifth Ave., New York, N. Y.

National Moulded Products Corp., 592 Pacific St., Brooklyn 17, N. Y., manufacturer of toys, advertising specialties, mannequins, and display figures, has appointed Eichorn Export Corp., 44 Whitehall St., New York, N. Y., exclusive distributor of all export products.

U. S. Rubber Buys Martin's Chemical Division

United States Rubber Co., Rockefeller Center, New York 20, N. Y., purchased the chemicals division of the Glenn L. Martin Co., Baltimore, Md., on December 27. The rubber company acquired all assets of the division, including the Marvinol vinyl resin plant at Painesville, O., laboratory equipment in Baltimore, patents, and the trade name, Marvinol. The purchase price was not announced.

The business will become part of the Naugatuck Chemical division of the rubber company. The Painesville plant will continue to make Marvinol vinyl resin for sale to manufacturers of plastic products.

Through the sale of its chemicals division, Martin completes its program of concentration in the aviation field, by divesting itself of all interests not directly concerned with the manufacture of airframes, special weapons, and closely related products.

U. S. Rubber said the purchase is part of a long-range program to expand its activities in the chemical field.

"We are already in plastics and chemicals and have been interested in vinyl plastic for a number of years," said J. P. Coe, vice president and general manager of Naugatuck Chemical. "The company has carried on a long and intensive research program in preparation for the actual manufacture of vinyl. The opportunity to make such a top quality resin as Marvinol is, therefore, most welcome."

The plant at Painesville, built in 1947, currently employs about 200 persons, with a monthly payroll of $50,000. Consisting of nine buildings, it is the third largest vinyl plant in the country and the most modern of its type. It is close to raw material sources and has good rail, highway and water transportation facilities.

The present management at Painesville will continue in charge. Employes on the Martin payroll will be transferred to the rubber company's payroll at the end of the year, it was announced.

The operation includes about 65 employes in Baltimore connected with research and development, sales and technical service, whom it is planned to transfer to the Naugatuck Chemical plant, Naugatuck, Conn.

Executives Honored

Herbert E. Smith, chairman of the board of U. S. Rubber, has accepted the chairmanship of the rubber division of the 1950 Red Cross Fund campaign.

James W. Harley, director of traffic for U. S. Rubber, has been elected president of the Traffic Club of New York.

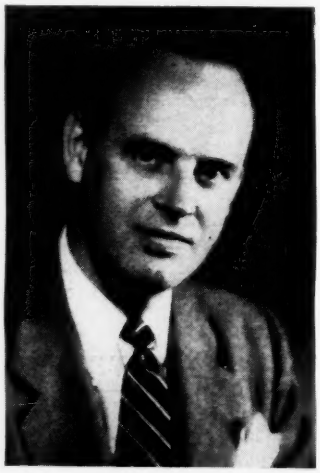
Hose for Refueling Farm Equipment

A new lightweight, high-strength hose designed for refueling tractors and other motorized farm equipment from either barrels or tanks has been developed by U. S. Rubber. The hose is constructed with an oil-resistant neoprene tube, a rayon braid carcass, built-in static wire, and a rubber cover especially designed to withstand abrasion. Available in sizes ranging from ⅝-inch to one-inch inside diameter in either specified cut lengths or random factory lengths, the new product will be marketed under the name U.S. Rainbow farm fuel dispensing hose.

Reed New Pequanoc President

Pendennis W. Reed has been elected president and a director of Pequanoc Rubber Co., Butler, N. J., succeeding Thomas N. D. Mace. Mr. Mace, president since April, 1948, relinquished that position for reasons of health, but continued with Pequanoc as vice president in charge of manufacturing and also on the board of directors.

Mr. Reed is a graduate of Princeton University, Class of 1931, and of the Yale University Law School. Following graduation he joined a law firm and at the opening of the war became the principal counsel for the War Production Board. In 1942 he entered the Navy where he attained the rank of lieutenant. Upon returning from the service in 1945, Mr. Reed became assistant to the president of Bishop Gutta Percha Co., New York, N.Y., and became president upon the death of his predecessor.

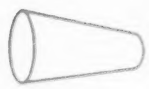
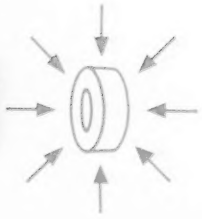


Pendennis W. Reed

Calco Research Men Promoted

R. H. Kienle, director of application research, American Cyanamid Co., Calco Chemical Division, Bound Brook, N. J., last month announced the following appointments: H. E. Millson, an assistant director of the application research department in charge of the dyes technical evaluation section; T. F. Cooke, an assistant director of the department in charge of the newly created products application section for the study and formulation of dyes, finishes, and pigments for new uses and the investigation of new and better application methods; R. J. G. Schofield, a section director in charge of the textile dyeing and printing group of the dyes technical evaluation section.

H. Muehlstein & Co. will move, on or about April 1, to the Lincoln Bldg., 60 E. 42nd St., New York, N. Y., from the previous location in the Chanin Bldg. The firm will occupy the 46th floor at the new location, and the new phone number will be Murray Hill 7-1400.

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN® TAPERED ROLLER  BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION 

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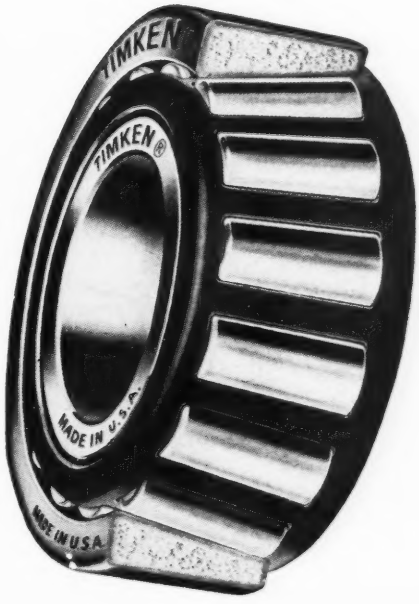
Timken bearings hold shafts in rigid alignment, preventing wobble or end-play. Due to precision manufacture and true rolling motion, friction is practically eliminated. And the line contact between rolls and races provides maximum load-carrying capacity.

Made of the finest material ever developed for tapered roller bearings—Timken fine alloy steel—Timken bearings normally last the life of the machines in which they're used.

No other bearing can bring you all the advantages you get with Timken tapered roller bearings. Be sure you have them in the machinery you build or buy. Look for the trade-mark, "Timken" on the bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".



TIMKEN

TRADE MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

New "Winterizing" Process

Winter driving safety, hitherto available only in special winter treads, can now be obtained at low cost through a "winterizing" process developed by The Firestone Tire & Rubber Co., Akron, O. The company has developed a tire winterizing machine which makes winter treads out of regular tire treads. The machine makes tiny perforations in the tread, creating thousands of sharp edges to contact the ice, snow, or wet pavements and give added traction. The treatment can be applied to all four auto tires.

Introduces Improved Tractor Tire

A revolutionary new farm tractor tire, featuring a curved bar, open center tread design, has also been announced by Firestone. The advanced design and construction of the new tire provides better traction, improved self-cleaning, longer service, and a smoother ride. Designated the Traction Center Curved Bar tractor tire, it has a tread design that provides deeper penetration of soil and firmer bite that delivers maximum traction under all farming conditions. This is accomplished by extending the open bars past the center of the tire and having them curve to the shoulder. Each bar has a 24% taper from the outside shoulder to the center section. Broader shoulder bars increase stability and improve wear resistance; while the center portion of the wedge shaped bar gives increased traction by permitting a sharper, deeper bit into the ground. Extra rubber in the center of the tread supporting each bar end strengthens the bars and increases service life. The tire is built with a gum-dipped cord body of wear resisting rubber in both tread and sidewalls. It has a flatter and wider tread, permitting more ground contact, and the curved bars provide automatic self-cleaning action.

Harvey Firestone, Jr., Honored

The December 20 issue of *Look* magazine gave recognition to Harvey S. Firestone, Jr., Firestone board chairman, for his long record of community service. A brief review of Mr. Firestone's welfare work, including service in the USO, Community Chest, and 4-H Club, appeared in the column "Look Applauds," devoted to outstanding persons who have made distinguished contributions to knowledge, culture, and the improvement of human relations.

Wooster Sales Conference

Wooster Rubber Co., Wooster, O., recently held a two-day sales conference attended by company representatives from all over the nation. Addressing the gathering on sales programs for the year were President J. R. Caldwell, Treasurer D. E. Noble, Miss E. Farrington, director of retail representatives, and Sales Manager J. R. S. Conybeare. It was reported that for the past year Wooster's retail business rose 89%.

The company, which manufactures Rubbermaid household goods, is offering three new products: a shelf covering, cup racks, and a cup and saucer rack.

Wooster last spring expanded its facilities to increase production capacity 53% and now plans for this spring a new addition to double present factory floor space. The firm employs about 500 workers.

Laurence F. Whittemore

Whittemore New President of Brown Co.

F. G. Coburn resigned as president of Brown Co. and Brown Corp., effective December 31.

Laurence F. Whittemore, who recently resigned as president of the New Haven Railroad, on January 1 assumed the presidency of both companies.

Mr. Coburn's resignation was accepted with extreme regret, and he has agreed to remain as a member of the board of directors. Mr. Coburn assumed the presidency of Brown Co. in August, 1943, at the request of the directors, to carry through a program of rehabilitation of the company's business and also its properties.

Mr. Whittemore has been actively associated with Brown Co. since 1935, when he became a member of a stockholders' committee during the company's reorganization. He became a director of the reorganized company in 1941. Among other industrial and managerial activities, Mr. Whittemore has been actively associated with lumbering operations in northern New England for many years past and is generally recognized as an expert in forest management and its by-product manufacturing fields.

At the directors' meeting last month in Boston, Mass., Mr. Coburn reported that Brown Co. is at present current with respect to interest payment and debt reduction, and by the initiation of dividend payments on its preferred stock on March 1, 1949, has stopped further accumulation. The company, he said, has adequate working capital, its cash position is excellent, and its earning power has been substantially strengthened.

Following the meeting, the Brown board also announced that it had voted unanimously to transfer the office of the president to Boston from New York, although the sales office of the firm will remain in New York. Mr. Whittemore will also maintain offices at Berlin, N. H., and La Tuque.

Milton W. Hayes, since 1948 manager of the production control department of Brown Co. at Berlin has been named assistant to Works Manager E. E. Morris. Mr. Hayes will be responsible for the Bermico, Onco, chemical, and floc manufacturing divisions and also will be responsible for the quality control department and its work throughout the Berlin operations.

Changes at General Electric

Zay Jeffries, vice president of General Electric Co. in charge of the chemical department, Pittsfield, Mass., on December 31 retired from the company with which he had been associated since 1914. He began as a consultant to the National Lamp works and won many promotions. In January, 1945, Dr. Jeffries was elected a company vice president and placed in charge of the newly formed chemical department, which has responsibility for operations pertaining to resins, insulating materials, plastics, silicones, etc.

C. Stewart Ferguson, engineering manager of the chemicals division, has been appointed West Coast Manager of that division, with headquarters at the division's plant at Anaheim, Calif. There he will have charge of engineering, manufacturing, and sales of chemicals division products on the West Coast. This move places on the West Coast a member of General Electric management so that business decisions may be reached more effectively and to serve the needs of customers and the needs of present and future business. Mr. Ferguson, who came to G-E after graduating from Renssalaer Polytechnic Institute in 1918, has been a chemist in the G-E research laboratory, a designing engineer, and engineer in charge in the former resin and insulation materials division. Throughout the years he has had much to do with the development of G-E Glyptal alkyd resins and with G-E silicones.

Paul F. Preston has been named new engineering manager of the chemicals division; he will also continue as manufacturing manager of the division, a position he has held since coming to General Electric last February.

Curran with Dewey & Almy

Dewey & Almy Chemical Co., Cambridge, Mass., on December 1 appointed George L. Curran to the sales staff of its rubber specialties division. He was formerly sales and advertising manager of Moore Pen Co., and previously had been regional sales manager for Eagle Pencil Co.

Mr. Curran's appointment was occasioned by Dewey & Almy's expanding production of such items as playballs, toys, doll skins, self-inflating duck decoys, and bladders for athletic balls.

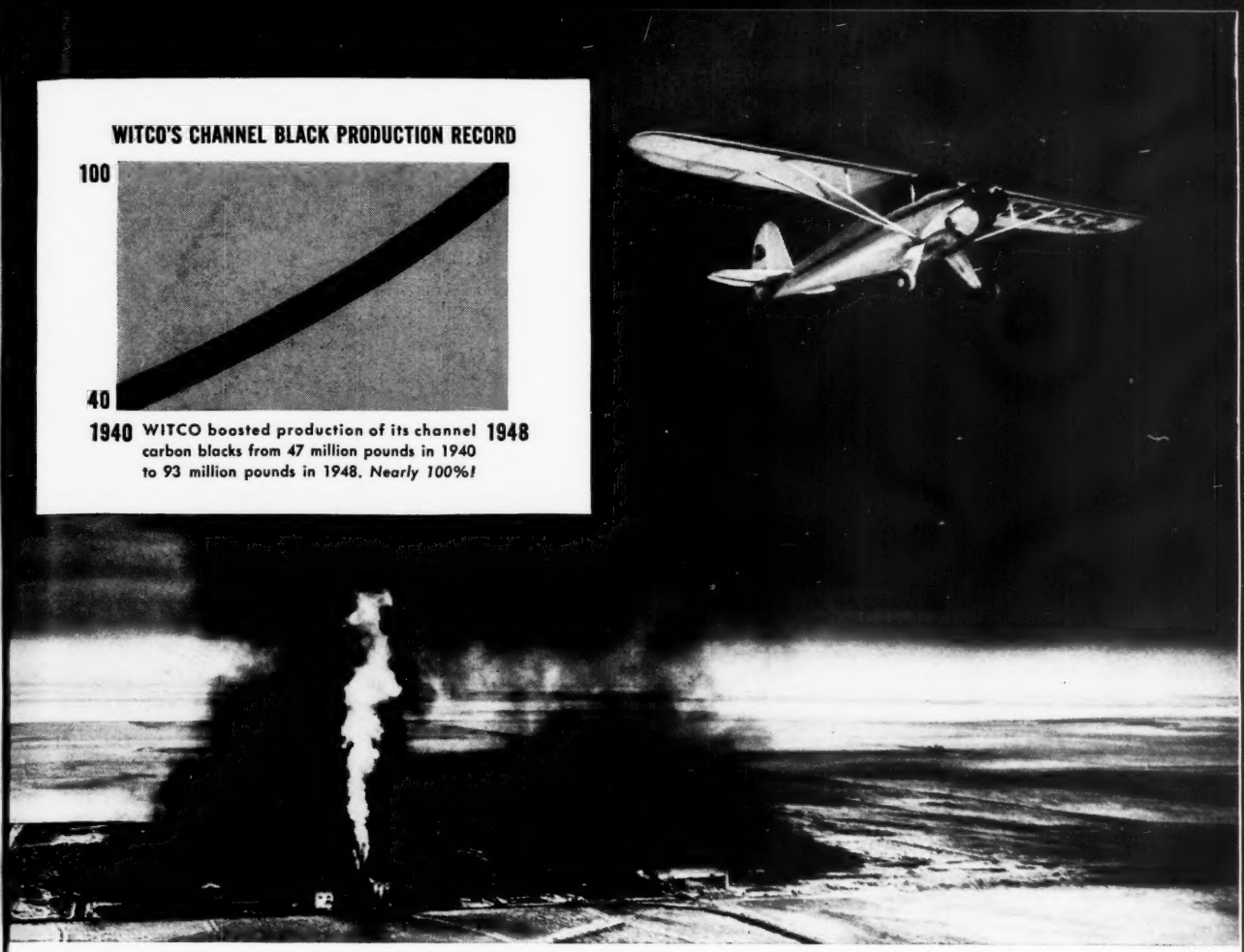
Developed by the rubber specialties division's Harry A. Andrews, Jr., and W. Calvin Robinson, the new items have met with notable success. With the addition of Mr. Curran, the division plans to produce and promote other new rubber products and develop a tighter national sales organization by using factory representatives in addition to key men in the home office.

Changes at Stein, Hall

Morris S. Rosenthal, president of Stein, Hall & Co., Inc., 285 Madison Ave., New York, N. Y., has announced the resignation of Joseph A. King as manager of the Providence branch office.

Roswell D. Armstrong, manager of Stein Hall's Boston office for a number of years, has been appointed New England manager besides his other duties.

Jesse A. Fraser, long a member of the Providence staff, has been appointed manager of that office.


WITCO'S CHANNEL BLACK PRODUCTION RECORD
100
40
1940
1948
WITCO boosted production of its channel carbon blacks from 47 million pounds in 1940 to 93 million pounds in 1948. Nearly 100%!

The burners in **WITCO'S** channel black installations are burning up **production records,** too

As the graph shows, more and more tiny flames, burning day and night, have increased Witco's production of Continental Channel Blacks during 1940 through 1948 from *47 million pounds to 93 million pounds!*

In Continental Channel Blacks, Witco offers a complete, highly specialized line of products for specific needs in all types of rubber compounding—constantly controlled and improved by laboratory and pilot plant research.

Write for samples of WITCO and CONTINENTAL Carbon Blacks for your own staff to evaluate. Or send for complete information.

WITCO CHEMICAL COMPANY

CONTINENTAL CARBON COMPANY

295 Madison Avenue, New York 17, N. Y.

Boston • Chicago • Detroit • Cleveland • Los Angeles • San Francisco • Akron • Amarillo • London and Manchester, England

Changes at Goodrich

Bernard M. Costello has been named vice president-manufacturing and William E. Ireland vice president-sales of International B. F. Goodrich Co., the foreign trade division of The B. F. Goodrich Co., Akron, O. Mr. Costello served as vice president and factory manager of B. F. Goodrich Co. of Canada, Ltd., for the last 11 years; while Mr. Ireland, with Goodrich for 15 years, became merchandise manager of the International Goodrich company in 1947.

Fred C. Schulz has been appointed manager of sales development of the associated lines sales division at Goodrich and has been succeeded as operating manager of the division by William C. Keating. Mr. Schulz has been with the company since 1935, and Mr. Keating joined B. F. Goodrich 10 years ago.

Tire Developments

The Super Hi-Cleat, a tractor tire of new design with a new feature, the "Power-Curve" tread, has been announced by Goodrich. Of the open-tread type, the new tire, it is claimed, will give better drawbar pull, longer life, smoother ride, and better pavement wear than the tire which it has succeeded, while retaining all advantages of its predecessor. The higher cleats for deeper penetration and extra traction are placed exactly parallel to form a channel for natural self-cleaning without any obstructions. The channel formed by the "Power-Curve" cleats is exactly uniform in width from the center of the tire to the shoulders, insuring free flow of soil from between the cleats. The curve provides the necessary reinforcement for the high cleats, reducing "scrubbing" action on hard surfaces and increasing long wearing qualities. The shape also reinforces the cleat at the tread center area where maximum penetration is desired and where the wear is most rapid. The forward points of the cleats are offset to prevent their obstructing each other and alternately placed to prevent bumping of the tire as it rolls. The new design also includes a furrow strip, a band of thick rubber on the shoulder which increases tire life by resisting rubbing against the sides of the furrows. Another new feature is the raised edge formed on the sidewalls by the extension of the cleat design, giving extra traction in deep or sandy soil.

One out of every 17 new passenger-car tires sold this year has the special mud-snow traction tread, Goodrich estimates, whereas before the war this figure was only one in 100. These statistics do not include recaps of traction tread. Even so, the company predicts that at least two million unfortunate motorists will still get stuck in snow or mud during the winter months. Before the war the mud-snow tread enjoyed its greatest popularity in rural areas, but now has achieved equal acclaim in city and suburban use. Today the annual change-over to mud-snow tires is becoming as much a part of the car winterizing routine as winter oils, greases, and anti-freeze.

Collyer Receives French Decoration

John L. Collyer, Goodrich president, was decorated with the French Legion of Honor for services rendered to the allied cause during the war and to French industry during reconversion. The citation was presented on December 13 to Mr. Collyer in his office by J. J. Viala, French Consul-General, in the presence of other French and company officials. In announcing the decree by President Vincent Auriol making Mr. Collyer a Chevalier of the Legion of Honor, French Ambassador Henri Bonnet said,

"This highly deserved distinction granted to Mr. Collyer by the French Government is a token of our gratitude for the services he rendered to the allied cause during the war, and to French industry in its reconstruction period, especially by the encouragement he gave to the closest cooperation between French and American technicians."

Better Sales Training Needed

According to a recent article in the *New York Journal of Commerce* by Harold M. Parsekian, director of sales and technical service, chemicals division, Glenn L. Martin Co., Baltimore 3, Md., engineering schools should offer students a wider choice of electives in sales-background subjects.

"Hundreds of potentially priceless chemical developments are gathering dust on the shelves of the nation's research laboratories because there are not enough adequately trained men to sell the industry's new products."

In recent years industry has realized the futility of relying on any but technically trained salesmen, and as a result there is presently a serious shortage of men properly equipped to handle these specialized jobs. The engineer's training does not fully prepare him for sales work, because selling is founded upon human rather than upon mathematical values. To fill the need of trained men, cooperation of the high schools and colleges with the chemical industry is vitally needed, Mr. Parsekian noted. Schools should offer engineering students a wider choice of electives in sales subjects; while industry can help in vocational guidance by making key personnel available for interviews and for campus speaking engagements.

Farrel Adds to Equipment

Farrel-Birmingham Co., Inc., Ansonia, Conn., has widened the experimental range of its process testing laboratory at Derby, Conn., by the addition of a new mill, a Z-type calender, and other new equipment. The mill is an 8- by 16-inch two-roll type with several design features; one is the individual drive for each roll. With either roll capable of running at any speed from 4-35 r.p.m., a wide variety of friction ratios is possible at different speed levels. The Z-type calender also features versatility, and a variable speed gearmotor for the main drive furnishes adjustable levels of speed for all four calender rolls. The rolls may be set at related speeds most advantageous for film, single coating or double coating. Other new equipment includes a small-size Rotocure for continuous vulcanizing of belting, flooring, and matting; a preheating oven with a range of 70-500° F.; and a blade-type mixer for light materials. Improvements to existing equipment include the addition of an electric heating unit to provide closely regulated heat for the oil used to control the temperatures of the chamber sections of the plasticator-extruder. This heating unit, with a range of 70-500° F., can maintain varied temperatures in as many as five different sections of the screw chamber.

Goodyear Advances Several

Important changes in the top level of sales management of Goodyear Tire & Rubber Co., were announced recently by R. S. Wilson, vice president, at a meeting of the company's district sales managers, at Akron, O.

These changes were the advancement of Victor Holt, Jr., to the vice presidency of Goodyear's sales company, The Goodyear Tire & Rubber Co., Inc., in charge of the replacement tire division, succeeding J. E. Mayl, vice president, who moves up to the position of sales coordinator. In his new position Mr. Holt will have charge of all tire replacement sales, including dealer, company stores and car and home supplies. For the past five years he has held the position of manager of the tire sales department reporting to Mr. Mayl, who now assumes responsibilities in an enlarged field including the full line of Goodyear products whose sales are directed by Mr. Wilson.

Mr. Holt came to Goodyear, November 1, 1929, as a staff trainee, worked on the order desk at the Kansas City branch, moved to Oklahoma City as adjuster and then general line salesman and special truck tire representative, served as store manager in Miami, Fla., and returned to Akron as sales promotion manager and as Life Guard sales manager. He was manager successively of the Harrisburg and Philadelphia sales districts and, before last returning to Akron, was assistant manager of the north central division.

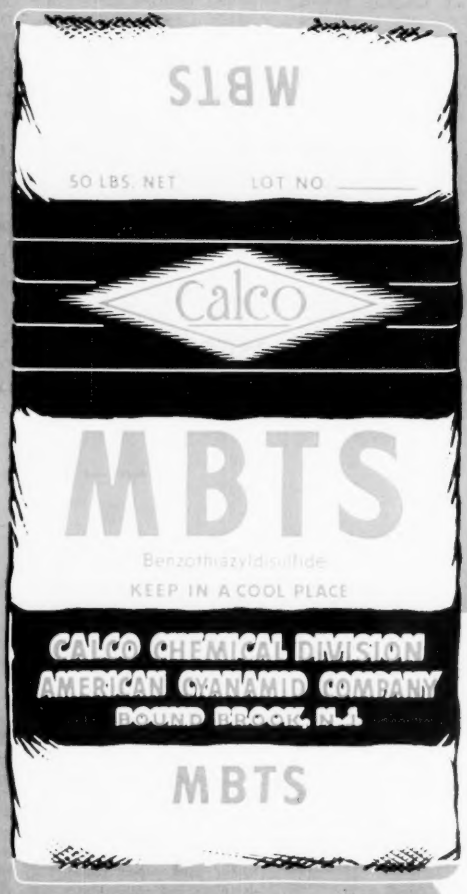
Mr. Mayl joined the company in 1925 as assistant manager of truck and bus tire sales. After three years in that department, during which he became sales manager, he advanced to manager of the southern sales division, returning to Akron in 1930 as tire sales manager. In 1937 he was elected vice president of the California subsidiary, at Los Angeles, then again returned to Akron in 1944.

New Hose Introduced

A new-type dual welding hose made in two colors of vinyl plastics has been designed by Goodyear engineers. The two-hose tubes, one bright green and the other vivid red, have been "welded" together under heat and pressure to form a two-way unit that handles as easily as one hose. Constructed of rayon braid to give it high burst pressure and extreme flexibility, the new hose has no webbing or excess material that would require extra preparation for installing couplings. The hose has a smooth, glossy surface, is oil resistant, will not support fire, and has abrasion resistance superior to that of ordinary rubber covered welding hose, it is further claimed by the manufacturer.

The development of Ortac, a new all-purpose hose, has been announced by Goodyear's mechanical goods division. The new hose is capable of carrying air, water, oil gasoline, and acids of low concentration and temperature. The hose is made with vertically braided rayon carcass and oil-resisting synthetic rubber tube, friction, and cover. It is being made in sizes from 3/16- to 1½-inch inside diameter in the company's Plant 2 at Akron.

A new mine sprinkler hose which, it is said, will greatly improve safety conditions in underground mines was also announced by the mechanical goods division. Being manufactured in the ¾-inch size only, the hose is constructed with high-tensile rayon yarns and covered with tough, abrasion-resistant rubber stock. Unlike conventional



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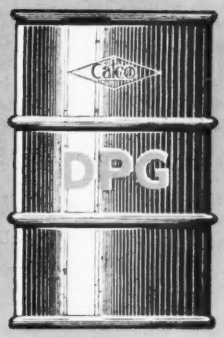

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CALCO CHEMICAL DIVISION
RUBBER CHEMICALS DEPARTMENT
BOUND BROOK, NEW JERSEY

Calco

SALES REPRESENTATIVES AND WAREHOUSE STOCKS: Akron Chemical Company, Akron, Ohio • Ernest Jacoby & Company, Boston, Mass. • Herron & Meyer of Chicago, Chicago, Ill. • H. M. Royal, Inc., Los Angeles, Calif. • H. M. Royal, Inc., Trenton, N. J. • In Canada: St. Lawrence Chemical Company, Ltd., Montreal and Toronto.

mine sprinkler hose which has been made of black rubber in the past, the new hose is bright yellow and easily discernible in dark mine shafts, thus enabling miners to find sprinkler valves easily as well as preventing truckers from running over the hose.

Construction of giant rubber hose units, weighing more than four tons each and measuring more than three feet inside diameter has begun in Goodyear's mechanical goods plant. Classified as sand suction and discharge hose, for use on Mississippi River dredges, the hose is said to be the largest being built today. Made in 20-foot lengths with an inside diameter of 38 inches and a unit weight of 8,080 pounds, the hose consists of 15 plies of rubberized fabric and a coil of 7/8-inch copperized steel wire for reinforcement over a one-inch tube of high-grade natural rubber. The hose is cured at 250-275° F. for 270 minutes, and 12 hours are required for the cured hose to cool sufficiently to be handled.

Belting Developments

Goodyear belting engineers have redesigned the impact cushioning pneumatic idler for conveyer belts. These idlers were first introduced by the company in 1938 and consisted of regular industrial tires, small in cross-section and large in overall diameter, which were difficult to adapt to a conveyer structure. The new idler uses airplane tires which will absorb several times the shock of the tires formerly used. The most popular airplane size, 6.00-6, has a small diameter easily adapted to conveyer systems. The 36-inch size consists of six 6.00-6 tires mounted on a simple stand with the whole unit on one axis rather than offset. The new development offers conveyer belt users more latitude in the size of bulk material to be handled on a belt system.

Completion of 2½ years' experimental work testing rayon carcass belts in underground mines has resulted in the addition of a new-type conveyer belt to Goodyear's Coal-Flo line. More than 3,000 feet of the new belt were tested in mines before regular production was scheduled, according to H. E. Morse, manager of the mechanical goods development department. Use of a four-ply rayon carcass structure, thinner and lighter than conventional fabrics, results in a highly flexible belt particularly adapted to the close operations experienced in mines. Rayon's greater strength also permits the use of belt systems having long pulley-to-pulley centers, thus reducing the number of transfer points and the number of drives required. The rayon belt also incorporates mildew resistance and acid neutralization. The new product is being manufactured in standard 26- and 30-inch widths.

New Brake, and Tire Announced

A revolutionary industrial brake, adapted by Goodyear technicians from the airplane-type single disk brake, has shown during a one-year testing and development program that it can save users of heavy mobile or stationary machinery from 25-50% of maintenance costs resulting from brake failures. Developed under the direction of C. A. Hulsemann, sales engineer, the non-self-energizing brake gives a soft cushion braking action in contrast to the quick-grabbing action of conventional drum types. The experimental program began in May, 1948, when Goodyear engineers in cooperation with the Joy Mfg. Co. installed a test model of the brake on a Joy shuttle car used in a mine of Old Ben Coal Corp., West Frankfort, Ill. The brake lowered the down time of the shuttle car by more than one-half, and similar brakes are now being installed on all of the mine's shuttle cars. Goodyear has adapted the brake to many types of mining equipment, and engineers are preparing designs for application on mine locomotives, slushers, post pullers, portable oil well drilling rigs, iron ore tram cars, auxiliary brakes for earthmoving units, and many other heavy industrial machines.

The development of a new truck tire, the Hi-Miller Xtra Tred, was announced by Goodyear as the latest version of its popular predecessor by the same name. The new tire is said to retain all of the long-wearing qualities of its predecessor while giving even greater skid resistance. Of all-natural rubber construction and made with either rayon or nylon cord, the new tire has an exceptionally deep non-skid surface plus a wider and flatter tread contour. The tread has a non-skid design of zigzag grooves and notches that supply a multitude of road-gripping edges, an important factor in preventing "jackknifing" of a heavy vehicle. The tire is available in sizes ranging from 8.25 through 11.00.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced that it has authorized, for the second year, $100,000 for grants-in-aid to universities for unrestricted use in the field of fundamental chemical research. This program was inaugurated last year by Du Pont on a trial basis with the aim of increasing the amount of research being done in this country. The new grants, for the 1950-1951 academic year, provide $10,000 for each of 10 universities, all of which received similar awards this year. The company also provided $20,000 to the University of Chicago for a 1950 membership in its Institute for the Study of Metals. In this program the universities themselves select the research projects for which the grants will be used; the only stipulation is that they be free from any commercial implications at the time the work is initiated. Du Pont emphasized that there shall be complete freedom in the communication and publication of the results of the research work supported by the grants. The 10 institutions sharing the grants are California Institute of Technology, Massachusetts Institute of Technology, and the universities of Cornell, Harvard, Ohio State, Princeton, Yale, Illinois, Minnesota, and Wisconsin.

Warwick Wax Co., Inc., subsidiary of Sun Chemical Corp., Long Island City, N. Y., has appointed two distributers for their microcrystalline Mekon waxes, emulsifiable Cardis waxes, and Sugar Cane wax. The E. S. Browning Co., Division of Innis Speiden Co., will have exclusive distribution in California, Oregon, and Washington. The sole distribution of the aforementioned wax products in Georgia, Florida, Alabama, and Mississippi, will be handled by the L. C. Morris Co.

The Sun Rubber Co., Barberton, O., according to General Manager T. W. Smith, Jr., has upped output of its rubber-covered fabric volley and waterpolo balls and basketballs to take care of demands for the winter indoor sports season.

The Department of the Army, Washington, D. C., recently listed the following contracts awarded: Dewey & Almy Chemical Co., Cambridge, Mass., 68,900 balloons, value, $374,914; General Cable Corp., Philadelphia, Pa., 60,000 miles of wire, $3,000,000; Firestone Tire & Rubber Co., automotive spare parts, $144,910; McCreary Tire & Rubber Co., tires and tubes, $357,660; Pennsylvania Rubber Co., tires and tubes, $121,765; Mohawk Rubber Co., tire repair materials, $105,484; Armstrong Rubber Co., tires and tubes, $1,053,132; Cooper Tire & Rubber Co., tires and tubes, $683,700; Mansfield Tire & Rubber Co., tire and tubes, $102,119; Mohawk Rubber Co., tires and tubes, $1,240,488.

Ohio Adhesives Corp. recently completed its new adhesive plant at New Philadelphia, O. This factory manufactures resin and rubber adhesive for the industrial, automotive, and building trades.

George Lamson, with The Thermoid Co., Trenton, N. J., since 1935, has been named manager of its automotive replacement sales division.

WEST

International Trade Fair

Preparations are under way for the first United States International Trade Fair, to be held in the Coliseum, International Amphitheater, and Navy Pier at Chicago, Ill., on August 7-19, 1950. The Fair has set up headquarters at the Congress Hotel in Chicago to act as a clearing house for inquiries from domestic and foreign manufacturers. There will be 1,000,000 square feet of covered exhibition space available for display purposes in the three convention halls, and other halls will be used if the demand for space requires. Approximately 2,000 foreign manufacturers have already notified the Department of Commerce of their desire to exhibit goods at the Fair.

The Department of Commerce and Paul G. Hoffman, ECA administrator, have endorsed plans for the Fair as "one of the best methods of bringing buyers and sellers together from all parts of the world, and as an important means of enabling Marshall Plan countries to earn more dollars." Domestic manufacturers have recognized the value of such an international show, and it is believed that domestic products will occupy about one-third of the display space. An attendance of 75,000 buyers and 300,000 other persons is expected at the Fair during its 13-day run.

Rubberite Corp., 1201 E. 63rd St., Los Angeles 1, Calif., has begun operations fabricating and selling rubber and allied products for general industry. Associated in this new concern are T. N. Wilson, R. W. English, and H. C. Lien.

The Cleveland Liner & Mfg. Co., 5508 Maurice Ave., Cleveland 4, O., has appointed G. R. Steinbach, of Merit Western Co., 1248 Wholesale St., Los Angeles 12, Calif., its sales agent for the West Coast.

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NEWS ABOUT PEOPLE

Hugo Pulver

Hugo Pulver, executive vice president of H. Kohnstamm & Co., Inc., 83 Park Pl., New York 7, N. Y., was honored December 12 by a surprise testimonial dinner attended by 120 employes of the company's Chicago office and sales organization. The dinner, held at the Lake Shore Athletic Club, celebrated Mr. Pulver's fiftieth anniversary with the company. Mr. Pulver joined Kohnstamm in 1899 as an errand boy in the Chicago office shipping room. Shortly after the turn of the century he was assigned some outside sales territories and in 1923 was made vice president and manager of the Midwest division. Mr. Pulver is now also a director of the company and is actively engaged in the direction of Kohnstamm's midwestern divisions.

Alex Schulman, head of the scrap rubber firm, Alex Schulman, Inc., Akron, O., was one of the speakers at the recent organizational meeting of the Atlantic Division of the National Association of Waste Materials Dealers, Inc., held at the Hotel Astor, New York, N. Y.

David Douglas Haldane, until recently distributing agent and deputy director of the Reconstruction Finance Corp. Office of Rubber Reserve, has joined Littlejohn & Co., Inc., 120 Wall St., New York 5, N. Y., as vice president.

Miss Margaret Gibbons is new purchasing agent of Arabol Mfg. Co., producer of latex cements, with offices at 110 E. 42nd St., New York 17, N. Y., and plants in Brooklyn, N. Y., Chicago, Ill., and San Francisco, Calif.

Foster Dee Snell, head of the firm of consulting chemists and engineers, Foster D. Snell, Inc., 29 W. 15th St., New York 11, N. Y., recently made the following addresses: "The Position of the Consulting Laboratory in Industry," Draper Chemical Society of New York University, November 10; "Surface Activity and Detergency," The American Electroplater's Society, Newark, N. J., November 18.

Wendell P. Metzner has been appointed research director for the Rubber Service department of Monsanto Chemical Co.'s organic chemicals division in Nitro, W. Va. Dr. Metzner, associate research director for the department since September, 1947, has been with Monsanto since 1936. A graduate of Indiana and Chicago Universities, Dr. Metzner was first employed by Monsanto as a research chemist at the St. Louis plant. In 1939 he became a group leader in St. Louis and in 1945 was transferred to the central research department at Dayton, O., as a research group leader, a position he held until his appointment to Nitro.

John S. Shaw, director of safety of Hercules Powder Co., Wilmington, Del. retired January 1. He joined the company in 1913 after seven years with the old du Pont organization.

Raymond E. Nelson has joined General Latex & Chemical Corp., 666 Main St., Cambridge 39, Mass., in an executive capacity. For the past two years, until the firm discontinued its importation of rubber latex, Mr. Nelson was manager of the latex department of H. A. Astlett Co., New York, N. Y. For ten years prior to that connection, he served Naugatuck Chemical Division, United States Rubber Co., as technical sales representative and then as assistant sales manager of the latex division. Mr. Nelson was a Rubber Reserve agent for sale and repurchase of latex during the early days of the Rubber Control Order, and his experience was of value as a member of a number of government and industry cooperative committees. During the early postwar years he was associated with new product development and sales promotions of plastic products produced at Naugatuck.

Ansel B. Hendron has been appointed sales engineer for the Roth Rubber Co., Cicero 50, Ill., manufacturer of mechanical and sponge rubber products. For the past 13 years Mr. Hendron was with the Central Rubber & Mfg. Co., Belvidere, Ill., serving in both administrative and executive capacities.

Morris S. Rosenthal, president of Stein, Hall & Company, Inc., New York, N. Y., will serve as chairman of the exports and imports division of the 1950 New York Heart Campaign.

Daniel M. Magee recently was appointed selling agent for Velon yarn by the Firestone Plastics Co., Pottstown, Pa. He will make his headquarters at the New York office of the company in the Empire State Bldg. at 350 Fifth Ave. Mr. Magee has been in the plastics business for the past 15 years, since he attended Tulane University, and was connected with Celanese Corp. of America and The National Plastic Products Co. During the war he served as plastics consultant with the War Production Board and also was officer-in-charge of plastics applications in military aircraft in the West Coast division of the Air Force Materiel Command.

G. G. Beard

G. G. Beard has been elected executive vice president of United Engineering & Foundry Co., Pittsburgh, Pa. Mr. Beard began his service with United as an engineer in 1927, became manager of the proposal department in 1935, was placed in charge of sales engineering in 1943, was elected a vice president in 1943, and became a director of the company in 1944. Mr. Beard is also president of Lobdell United Co., Wilmington, Del., and of Stedman's Foundry & Machine Works, Inc., Aurora, Ind., both wholly owned subsidiaries of United Engineering.

John Norman Dean, recently appointed managing director of the Telegraph Construction & Maintenance Co., Ltd., and Selborne Plantation Co., Ltd., has been visiting in this country. Mr. Dean is well-known in the rubber industry especially for important developments in the field of submarine cables. His company produced the first successful Atlantic telegraph cables, laid in 1866, and since that time has produced about 400,000 nautical miles of cables, representing about 90% of the world's total output.

The Selborne Plantation, located about 10 miles from Kuala Lipis in the jungle of Pahang, Malaya, produces gutta percha from leaves of the tree. The crude gutta percha is refined and comes on the market as White Gutta, used by practically all well-known golf ball manufacturers for golf ball covers.

Cornelia T. Snell officially represented the American Chemical Society Committee on International Relations at a conference on Educational Reconstruction, held at Hunter College, New York, N. Y., on November 10.

Bruce S. Williams, formerly manager of the southeast territory, belting division, Russel Mfg. Co., Middletown, Conn., has been appointed assistant to the president, it was announced December 21 by his father, G. M. Williams, president of the company. The younger Mr. Williams attended Sheffield Scientific School of Yale University, but left before graduation to enlist in the U. S. Naval Reserve. Following his discharge after the war, he studied industrial management and marketing at Babson Institute.

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Our products are engineered to fill every need in natural and synthetic rubber compounding wherever the use of vulcanized oil is indicated.

We point with pride not only to a complete line of solid Brown, White, "Neophax" and "Amberex" grades, but also to our aqueous dispersions and hydrocarbon solutions of "Factice" for use in their appropriate compounds.

Continuing research and development in our laboratory and rigid production control has made us the leader in this field.

The services of our laboratory are at your disposal in solving your compounding problems.

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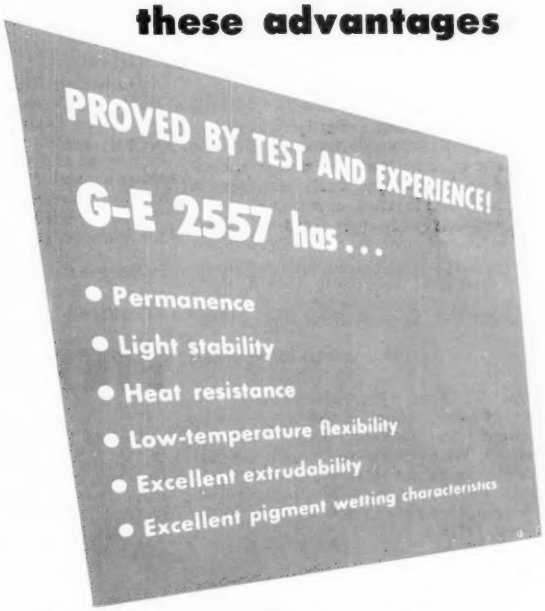

General Electric now offers vinyl and rubber compounders a new plasticizer, G-E 2557. This polyester-type plasticizer combines the desirable features of both polymeric and monomeric plasticizers. It has outstanding permanence and a wide range of compatibilities. G-E 2557 has unusual heat and light resistance and low volatility. Its low viscosity makes for easy handling.

The easy handling, compounding, and processing characteristics of G-E 2557 are helping vinyl, rubber, and lacquer manufacturers simplify their operations, speed up their output and produce high quality products.

General Electric is prepared to furnish you with technical assistance on plasticizing problems. Why not find out what G-E 2557 plasticizer can do for you? For full technical information on G-E 2557, write us at Section CD50-C1, Chemical Department, General Electric Company, Pittsfield, Mass.

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Harry L. Fisher, director of organic research, U. S. Industrial Chemicals, Inc., upon his retirement from that organization this month, will associate himself with National Research Council, Washington, D. C. Dr. Fisher will be working on arrangements for the meetings of the International Union of Pure and Applied Chemistry and the XIIth International Congress which are to be held in Washington and New York in September, 1951.

T. D. Dantzler, who resigned recently his executive position with Sierra Rubber Products & Engineering Co., Inglewood, Calif., has purchased stock in Pittman Products, Inc., 2050 Laura Ave., Huntington Park, Calif., and is now vice president and technical director of the firm.

Elmore J. Baruth recently joined the technical staff of Brown Rubber Co., Inc., manufacturer of molded and sponge rubber products at La Fayette, Ind. Mr. Baruth has had about 15 years' experience in the rubber industry with such firms as American Container Corp., as chief chemist and plant engineer; Depew Container Corp., as factory manager; McCreary Tire & Rubber Co., as technical director; and The Richardson Co., as production superintendent.

John T. Cox, Jr., has resigned as deputy director, Office of Rubber Reserve, Reconstruction Finance Corp., effective January 1. He joins Russell S. and Gordon W. McBride as chemical engineering consultants at Washington, D. C., but also will retain a consulting and advisory relation with ORR.

Wilbur H. Miller has been appointed by American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., technical representative and assistant manager of its Washington, D. C. Office. Dr. Miller will act as liaison between the various governmental laboratories and American Cyanamid's technical facilities. He has been on the staff of Cyanamid's Stamford research laboratories since 1941.

E. D. Bent, since January, 1949, assistant chief engineer of the wire and cable division, Northern Electric Co., Ltd., 1600 Notre Dame St., West, Montreal (3), P. Q., has been appointed chief engineer, succeeding N. L. Dann, who died recently in his sixty-first year. Mr. Bent joined the company's wire and cable laboratory in September, 1929, was put in charge of the wire and cable laboratories in 1941, and made design and development engineer in 1947.

Walter Westman has joined Sierra Rubber Products & Engineering Co., Inglewood, Calif., as chief chemist. He was formerly with Atlas Sponge Rubber Co., Los Angeles.

T. J. Crosby, of the Boston, Mass., office of H. Muehlstein & Co., Inc., 122 E. 42nd St., New York 17, and a member of the executive committee of the Scrap Rubber Institute, spoke on scrap rubber at the organization meeting of the New England Division of the National Association of Waste Material Dealers, Inc., at the Hotel Statler, Boston, on December 7.

Ernest Brazil has resigned as general manager of Blue Star Mines, Ltd., Los Angeles, Calif., to set up business for himself at 840 S. Mission Rd., Los Angeles, handling non-metallic fillers for the rubber and allied industries. He also has his own laboratory on the premises.

A. J. Graham has been appointed vice president and general manager of Canadian General-Tower, Ltd., Galt, Ont. Mr. Graham has been with the company 20 years, having served as sales representative in the Montreal and Ottawa areas before coming to Galt in 1943 as sales manager. Mr. Graham has also been a director of the company for the last five years.

Dominion Rubber Co., Ltd., Montreal, P. Q., on December 14 at the annual dinner of its Quarter Century Club, at the Mount Royal Hotel, Montreal, inducted 14 new members. Personnel from Montreal, Ottawa, and Quebec attended and heard C. C. Thackray, president of Dominion Rubber, review the company's operations for the past year.

FINANCIAL

United States Rubber Co., New York, N. Y. Nine months to September 30: net earnings, $8,619,600, equal to $2.68 a common share, compared with $15,216,798, or $6.42 a share, in the corresponding period of 1948; net sales, $396,551,121 against $431,930,181.

S. S. White Dental Mfg. Co., Philadelphia, Pa., and subsidiaries. Nine months to September 30: net profit, $535,283, equal to $1.79 each on 298,918 capital shares, compared with $928,822, or $3.11 each on 298,898 shares, in the like period of the previous year; net sales, $14,601,743, against $14,354,070; federal income tax, etc., $543,260, against $638,347.

Westinghouse Air Brake Co., Wilmerding, Pa., and subsidiaries. Third quarter, 1949: net profit, $1,561,575, equal to 49¢ a share, against $3,666,402, or $1.16 a share, in last year's quarter.

Taylor Instrument Cos., Rochester, N. Y. Year ended July 31, 1949: net income, $420,480, equal to $2.33 a share, against $308,039, or $1.71 a share, in the preceding fiscal year.

Rome Cable Corp., Rome, N. Y. Six months ended September 30: net profit, $86,606, against $508,938, in the same period of 1948.

Pittsburgh Plate Glass Co., Pittsburgh, Pa., and subsidiaries. Nine months to September 30: net income, $25,851,691, equal to $2.86 each on 9,030,182 common shares, compared with $23,095,998, or $2.58 each on 8,939,622 shares, the year before; net sales, $213,114,583, against $206,864,606.

Phillips Petroleum Co., Bartlesville, Okla., and subsidiaries. Nine months to September 30, 1949: net profit, $32,684,666, equal to $5.40 each on 6,047,240 shares, compared with $55,702,772, or $9.21 each on 6,045,255 shares, in the 1948 months; federal income taxes, $12,099,734, against $18,385,500.

Quebec Group

(Continued from page 441)

to which all currencies can be referred and also the restoration of European plants so that they produce enough to have goods available for international trade. The restoration of international trade is needed for world economy and for the equalization of living standards throughout the globe.

In the short business session preceding the talk, members decided that the Group decline an offer to join the rubber section of the Canadian Institute of Chemistry.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
American Hard Rubber Co.	Pfd.	$1.75 q.	Dec. 29	Dec. 19
Anaconda Wire & Cable Co.	Com.	1.00 yr. end	Dec. 20	Dec. 12
Armstrong Rubber Co.	A & B	0.25 q.	Jan. 3	Dec. 16
	Pfd.	0.59⅜ q.	Jan. 3	Dec. 16
Corduroy Rubber Co.	Com.	2.50 a.	Dec. 1	Nov. 25
	$3 Pfd.	3.00 a.	Dec. 1	Nov. 25
Crown Cork & Seal Co., Inc.	A	0.25 q.	Jan. 3	Dec. 19
	A	0.25 q.	April 4	Mar. 15
Crown Cork International	B	0.40 yr. end	Dec. 22	Dec. 19
Dewey & Almy Chemical Co.	Com.	0.25 q.	Dec. 20	Dec. 9
E. I. du Pont de Nemours & Co., Inc.	$4.50 Pfd.	1.12½ q.	Jan. 25	Jan. 10
	$3.50 Pfd.	0.87½ q.	Jan. 25	Jan. 10
Dunlop Tire & Rubber Goods Co., Ltd.	5% Cum. Red. First Pfd.	2½%	Dec. 31	Dec. 15
Electric Hose & Rubber Co.	Com.	0.30 q.	Nov. 25	Nov. 16
Faultless Rubber Co.	Com.	0.50	Jan. 3	Dec. 15
Garlock Packing Co.	Com.	0.25 q.	Dec. 27	Dec. 16
General Tire & Rubber Co.	4¼% Pfd	1.06¼ q.	Dec. 30	Dec. 20
	3¾% Pfd.	0.93¾ q.	Dec. 30	Dec. 20
	3¼% Pfd.	0.81¼ q.	Dec. 30	Dec. 20
Goodyear Tire & Rubber Co. of Canada, Ltd.	Com.	3.00 yr. end	Dec. 31	Dec. 9
Gro-Cord Rubber Co.	Com.	0.10 q.	Dec. 30	Dec. 20
Jenkins Bros.	Com.	1.00	Dec. 29	Dec. 16
	Non-V.	0.25	Dec. 29	Dec. 16
	Pfd.	1.75	Dec. 29	Dec. 16
I. B. Kleinert Rubber Co.	Com.	0.25	Dec. 14	Dec. 1
Midwest Rubber Reclaiming Co.	Pfd.	0.56¼ q.	Jan. 2	Dec. 14
Mohawk Rubber Co.	Com.	0.25 q.	Dec. 31	Dec. 15
Rome Cable Corp.	Pfd.	0.30 q.	Jan. 3	Dec. 12
Thermoid Co.	Com.	0.15 yr. end	Dec. 27	Dec. 15
Viceroy Mfg. Co., Ltd.	Com.	0.15 q.	Dec. 15	Dec. 1
	Com.	0.20 extra	Dec. 15	Dec. 1

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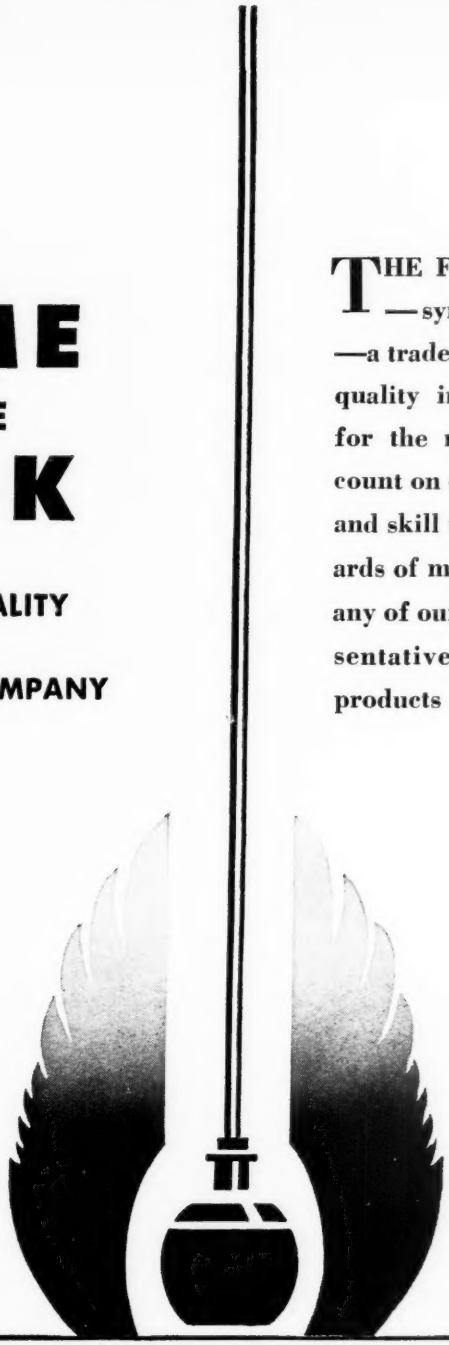

The C. P. Hall Co.
CHEMICAL MANUFACTURERS

AKRON, OHIO • LOS ANGELES, CALIF. • CHICAGO, ILL.

Patents and Trade Marks

APPLICATION

United States

2,486,669. **Rubber Repair Article Formed from Rubber Having at Least One Side Formed from a Layer of Unvulcanized Rubber Having a Tacky Surface Protected by a Covering of Thin Flexible Metal Foil so Designed That the Sheet Can Be Flexed in Any Direction without Tearing the Foil.** E. Nassimbene, assignor to Gates Rubber Co., both of Denver, Colo.

2,486,710. **Rubber Rib Mounting in a Helicopter Rotor Blade.** M. E. Gluhareff, Bridgeport, assignor to United Aircraft Corp., East Hartford, both in Conn.

2,486,806. **Diaper and Like Sheetlike Material Having a Coating of a Water Insolubilized Composition Containing Polyethylene Glycol and a Styrene-Maleic Anhydride Interpolymer.** R. B. Seymour and G. M. Schroder, assignors to Henry H. Frede & Co., all of Chattanooga, Tenn.

2,486,826. **Use of Polystyrene Beads in a Lubricating Composition for Shuffleboard Surfaces.** C. Decepoli, Belleville, assignor of one-half to J. D. Cacciarelli, Nutley, both in N. J.

2,486,871. **Anti-Corrosion Unit Including a Tubular Metal Head and a Metal Anode Member, and a Solid Filling of Plastic Electric-Insulating Material in the Head.** C. M. Osterheld, Stoughton, Wis., assignor to McGraw Electric Co., Elgin, Ill.

2,486,953. **Boot with Reinforced Toe Structure, Including Cords Embedded in a Compound between and Vulcanized to the Lining and Facing of the Boot Upper.** K. L. Keene, assignor to Mishawaka Rubber & Woolen Mfg., Co., both of Mishawaka, Ind.

2,487,027. **Floor Mat of Block Units Hinged together.** F. N. Merralls, Inglewood, assignor to Rubbercraft Corp. of California, Ltd., Los Angeles, both in Calif.

2,487,028. **Cushioning Device Including a Tubular Resilient Body and Conical Wedge Members in the Body.** A. F. O'Connor, assignor to Union Asbestos & Rubber Co., both of Chicago, Ill.

2,487,038. **Ear Insert for Earphones, Including a Conduit Member of Rubbery Material Including Interconnected Ballike Wall Sections, Each Having a Thin Flexible Skirtlike Protrusion to Provide an Acoustic Seal.** J. Baum, Bronx, assignor to Sonotone Corp., Elmsford, both in N. Y.

2,487,063. **Polyvinyl Butyral Silicate Polarizer Lamination.** A. M. Marks, New York, N. Y.

2,487,288. **Bellows Construction Including Large Rigid Annuli Alternating with Smaller Rigid Rings and Resiliently Flexible Washer-Like Members.** L. S. Williams, assignor to Toledo Scale Co., both of Toledo, O.

2,487,398. **Pneumatic Tire Including a Tread Portion with Radially Projecting Rubber Teeth and a Metal Strip Adhesively Secured to the Forward Face of Each Tooth.** V. S. Thompson, Ottawa, Ont., Canada.

2,487,427. **Doorstop Including a Rubber Tubing in Which Is Seated a Wire Bent in U Form.** H. and F. R. Drake, both of Chicago, Ill.

2,487,487. **Padding for Ironer Rolls, Including a Rubber Sleeve Having an Imperforate Outer Surface and Uniformly Spaced Tubular Recesses Opening into the Interior.** T. R. Smith, assignor to Maytag Co., both of Newton, Iowa.

2,487,546. **Inflated Toy with Sound Producing Means.** E. Harrowe, Hollis, N. Y.

2,487,554. **Fire and Heat Insulating Protective Sheath or Sleeve for Flexible Pipes, Etc., Including a Sleeve of Rubber-Like Material Having Asbestos Fibers Incorporated therein.** P. F. Hurst, assignor to Aeroquip Corp., both of Jackson, Mich.

2,487,630. **Syringe for Introducing Liquid into the Human Body.** O. J. Alvarez, assignor to Alvarez Patent Corp., both of New York, N. Y.

2,487,646. **Rubber Mounted Tail Rotor.** M. E. Gluhareff, Bridgeport, assignor to United Aircraft Corp., East Hartford, both in Conn.

2,487,649. **Expansion Belt for Garments, Including an Elastic Strip.** A. D. Grisanti, Mount Vernon, N. Y.

2,487,669. **Journal Box Seal of Elastomeric Material.** M. D. Pattulio and R. J. Shanahan, both of Wilmette, Ill.

2,487,694. **Enema and Douche Assembly.** C. F. Capell, Santa Monica, Calif.

2,487,780. **In a Loom Picker Having a Body Including a Barrel Portion and a Web Portion from Which a Projection Extends, Bearings of Resilient Material in a Bore in the Barrel and Guides of Resilient Material in the Web and a Picker Head of Rubber Impregnated Fabric.** H. M. Bacon, Dayton, O., assignor to Dayton Rubber Co., a corporation of O.

2,487,869. **Elastic Sheets with Hinge Connections.** L. E. Hamel, assignor to Lewis E. Hamel Co., Inc., both of Rochester, N. Y.

2,488,025. **In a Loom Picker of the Type Having a Picker Block on One Side and Means on the Other Side for Attaching the Block to a Picker Mechanism, at Least One Group of Square-Woven Rubberized Fabric Layers in the Picker Block.** E. Nassimbene, assignor to Gates Rubber Co., both of Denver, Colo.

2,488,096. **One-Piece Plastic Ignition Harness for Gasoline Engines.** W. R. Newman, Austin, Tex.

2,488,141. **In a Device for Processing Film, Drive Rollers Having Rubber-Like Rims.** V. E. Pratt and G. F. Gray, both of Norwalk, Conn.

2,488,142. **In a Film Feeding Mechanism, a Drive Roller Having a Resilient Film-Engaging Surface and a Pair of Rollers, Each Having a Resilient Film Engaging Surface Adapted to Force the Film into Contact with the Drive Roller.** V. E. Pratt, G. F. Gray, and D. E. Reed, all of Norwalk, Conn.; Gray and Reed, assignors to Pratt.

2,488,160. **One-Piece Plastic Holder for Snelled Fishhooks.** S. Behr, Flushing, N. Y.

2,488,211. **High-Frequency Cable Having Insulating Braiding and Continuous Insulating Sheathing of Thermoplastic Synthetic Resin.** C. G. Lemon, assignor to Tenaplas, Ltd., both of London, England.

2,488,227. **Hair Drier Including a Hood Formed of a Pliant, Airtight Material.** C. E. Nelson, San Mateo, Calif.

2,488,235. **Diving Mask with Pressure Equalizing Ear Cups.** W. R. Pfeiffer, San Gabriel, Calif.

2,488,295. **Elastic Guide for Cream Separator Shafts.** E. L. J. Jadoul, Brussels, Belgium.

2,488,317. **In a Method of Making Swatter Heads, the Use of a Rubber-Like Coating to Cover 11 Exposed Faces of a Multiply, Perforated Structure.** A. L. Murray, Auburn, Ind.

2,488,382. **Inflatable Cushions in a Pneumatic Foot Support.** W. W. Davis, Burbank, Calif.

2,488,397. **The Use of Thermosetting Resin in a Process for Securing Ornamental Effects in Textiles.** W. P. Hall, assignor to Joseph Bancroft & Sons Co., both of Wilmington, Del.

2,488,442. **Sheet of Flexible, Vinyl Resin Cemented to the Outer Surface of a Wool Felt Layer in Card Clothing.** E. A. Snape, Jr., Philadelphia, Pa.

2,488,446. **Polytetrafluoroethylene Surfaces in a Casting Mold for Resinous Compositions.** J. Swiss, McKeesport, assignor to Westinghouse Electric Corp., East Pittsburgh, both in Pa.

2,488,465. **Fluid Seal for a Rotating Shaft Including a Tubular Annulus of Resilient Material.** E. W. Bourne, Jr., Ramona, Calif.

2,488,693. **Therapeutic Device Including an Electric Motor in a Hollow Housing Small Enough to Be Held in One Hand; the Housing Has a Soft, Resilient Cushioning Cover and Soft Resilient Means Floatingly Mounting the Motor.** E. H. Tompkins, New York, N. Y.

2,488,872. **Conveyer Belt Made up of Interchangeable Elements Each Including a Force Transmitting Member in a Rubber Envelope, and Rubber Teeth Molded into the Ends of the Envelope of Each Belt Element.** P. J. Mathieu, deceased, late of Rambouillet, France, by S. B. Mathieu, Rambouillet; S. B. Mathieu, heir at law of the estate of P. J. Mathieu.

2,488,941. **Covered Rubber Cord for Use in a Woven Fabric.** G. O. Schneller, III, assignor to Ansonia O & C Co., both of Ansonia, Conn.

2,488,968. **Flexible Diaphragm Seal.** J. W. Devorss, Jr., Washington, D. C., assignor to United States Rubber Co., New York, N. Y.

2,488,988. **Air Supplying Bulb in a Nebulizer.** J. B. Schmitt, assigner to De Vilbiss Co., both of Toledo, O.

2,488,993. **Seat Construction Including a Supporting Base, an Inflated Elastic Cushion Having a Plurality of Pneumatically Interconnected Lobes, and an Elastic Cover.** M. C. Teague, Ridgewood, N. J., assignor to United States Rubber Co., New York, N. Y.

2,489,018. **Adaptor for a Woman's Galosh, Including a Semi-Resilient Block Adapted to be Detachably Seated in the Heel-Receiving Cavity of a Galosh.** N. A. Dodge, Takoma Park, Md.

2,489,111. **Panels of One-Way Stretch Elastic Webbing in a Reinforced Girdle.** C. Stone, New York, N. Y.

Dominion of Canada

460,661. **Diving Apparatus Including a Breathing Apparatus and a Non-Rigid, Watertight Suit.** J. Y. Consteau, Paris, France.

460,679. **Multiple-Chamber, Fluid Containing Inner Tube for a Pneumatic Tire, and Rubber Valve.** J. W. Liska, Stow, O., U.S.A.

460,714. **In a Method of Treating a Cake of Artificial Thread with Liquids, the Use of a Soft, Flexible Perforated Sheath of Elastic Material Such as Rubber for Insertion in the Cake.** D. C. F. Devos, Birdingbury, assignor to Courtaulds, Ltd., London, both in England.

460,782. **Nursing Nipple.** G. W. Goodson, North Haven, assignor to Seamless Rubber Co., New Haven, both in Conn., U.S.A.

460,868. **In a Telescoping Optical Observation Instrument, a Sealing Sleeve of Elastic Waterproof Material.** J. W. French, assignor to Barr & Stroud, Ltd., both of Glasgow, Scotland.

460,988. **In an Idler Roller for Belt Conveyers, a Tire of Non-Metallic, Resilient Material, and Non-Metallic Resilient Means Connecting a Pair of Tire-Supporting Disks with a Pair of Plates on a Supporting Shaft.** A. Searles, Moscow, Pa., and C. A. Swartz, Yonkers, N. Y., both in the U.S.A.

460,989. **In a Corrosion-Preventing Connection for a Cable to a Storage Battery, a Split, Non-Metallic Cover for a Split Metallic Clamping Member, and Non-Metallic Seals of Annular Contour.** M. A. Adams, Evangeline, La., U.S.A.

461,043. **In a Silent Car Wheel, a Resilient Bushing on the Driving Hub; the Bushing Includes Inner and Outer Metal Sleeves and a Body of Elastic Material therebetween.** R. H. Clapp, New Haven, Conn., and J. A. Phelan, New York, N. Y., assignors to Bethlehem Steel Co., Bethlehem, Pa., all in the U.S.A.

461,083. **A Strand of Glass Fibers Lubricated Against Mutual Abrasion and Bound together by a Coating Including Both an Oily and a Resin Siloxane.** L. P. Biefeld, Newark, O., U.S.A., assignor to Fiberglas Canada, Ltd., Oshawa, Ont.

461,172. **Sponge Rubber Belts in a Wrapping Machine.** J. F. Stalter, assignor to Wingfoot Corp., both of Akron, O.

461,197. **In a Sealing Packing, Elements of Plastic Material.** J-L. Gratzmuller, Paris, Seine, France.

461,215. **In Means for Extracting Air from Containers and the Like, a Nozzle, a Flexible Hose Detachably Connected thereto and Sealing Rings.** W. H. Wehrle, Cornwall, Ont.

461,216. **Protective Glove or Boot Having an Outer Layer of Non-Pervious Material Other Than Rubber, Such as Polyvinyl Chloride, Formed on a Prefashioned Surface of Wool or Other Absorbent Flexible Material.** G. K. White, Disley, Chester, England.

461,308. **In a Self-Sealing Pipe Coupling, an Annulus of Rubber between a Mobile Valve Seating and a First Conduit, and an Axially Perforate Annulus of Rubber between a Mobile Valve and a Second Conduit.** P. E. Thomas, Worcester Park, assignor to Sterling Industries, Ltd., London, both in England.

United Kingdom

630,345. **Resilient Wheels for Road Vehicles.** S. A. G. A. Soc. Applicazioni Gomma Antivibranti.

630,530. **Synthetic Film Surgical Dressings.** E. Taylor, Ltd., and R. Lant.

630,699. **Envelope for Inflatable Tubes for Use in the Repair of Tires and Other Rubber Goods.** G. Bigliardi and T. Jedrzejowski.

631,077. **Balloon Toys.** G. Ingram.

631,080. **Vehicle Brakes.** Dunlop Rubber Co., Ltd., and H. J. Butler.

631,140. **Flexible Cables.** Teleflex Products Co.

631,270. **Water-Tight Garments and Analogous Personal Coverings for the Human Body.** H. L. Williams.

631,302. **Inflatable Toy Balloons.** G. Ingram Sr.

PROCESS

United States

2,486,758-760. **Wrapping an Object in Stretchable, Thermoplastic Sheet Material.** F. B. Pfeiffer, Akron, O., assignor of one-half to J. R. Crossan.

2,486,761-762. **Wrapping Articles in Stretchable Sheet Material.** F. B. Pfeiffer, Akron, O.

2,486,995. **Vulcanized, Fabric-Upper Shoes.** L. L. Steed, Binghamton, assignor to Endicott Johnson Corp., Endicott, both in N. Y.

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2,487,232. **Embossed Battery Separator from Microporous Hard Rubber Sheet.** R. H. Gerke, Barrington, R. I., assignor to United States Rubber Co., New York, N. Y.

2,487,666. **Reclaiming Rubber.** J. O. Navone, Oakland, Calif.

2,487,830. **Patch to Repair Screens of Thermoplastic Material.** C. Robbins, II, Alexandria, Va.

2,488,112. **In the Process of Curing Isobutylene-Isoprene Copolymers, Heating the Compounded Copolymer for a Period Insufficient to Cure it, Stretching the Copolymer at Least 100%, and Completing the Cure.** F. P. Baldwin, Woodbridge, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,488,135. **Molding of Compositions Including Alginates.** E. G. Millatt, assignor to Alginate Industries, Ltd., (formerly known as Cefoil, Ltd.), both of Maidenhead, England.

2,488,212. **Sealing Thermoplastic Material.** J. H. Lloyd, Jr., Oak Park, assignor to Visking Corp., Chicago, both in Ill.

2,488,571. **Production of Film from a Crystalline Vinylidine Chloride Polymer.** R. R. Trull, assignor to Dow Chemical Co., both of Midland, Mich.

Dominion of Canada

460,848. **Multiple-Layer Ball.** F. T. Roberts, Ridgefield, Conn., U.S.A.

460,856. **Rubber Thread.** G. S. VanVoorhis, Easthampton, Mass., U.S.A.

460,963. **Flattened Thermoplastic Tubing of Predetermined Characteristics.** E. D. Fuller, assignor to Visking Corp., both of Chicago, Ill., U.S.A.

460,964. **Flattened Thermoplastic Tubing of Predetermined Characteristics.** B. H. Schenk, Western Springs, assignor to Visking Corp., Chicago, both in Ill., U.S.A.

461,110-111. **Production of Protective Sealed Containers for Liquids, Powders, Pastes, by Extrusion of a Tube of Thermoplastic Resin Composition.** C. L. Child, Welwyn Garden City, and R. L. Stephens, Hartford, both in England, assignors to Canadian Industries Ltd., Montreal, P.Q., assignor to Imperial Chemical Industries, Ltd., London, England.

461,167. **Forming a Smooth Adherent Moisture-Resistant Coating on an Electrical Device.** R. W. DeMonte, Glen Ridge, and A. B. Haines, Millburn, both in N. J., assignors to Bell Telephone Laboratories, Inc., assignor to Western Electric Co., Inc., both of New York, N. Y., both in the U.S.A.

461,208. **Hollow Articles from Plastic Sheet Material, Such as Rubber.** R. E. Roberts, Ridgefield, Conn., U.S.A.

CHEMICAL

United States

2,486,376. **Copolymer of 40 to 90% Butadiene and 10 to 60% Bornyl Methacrylate.** A. B. Craig and D. T. Mowry, both of Dayton, O., assignors to Monsanto Chemical Co., St. Louis, Mo.

2,486,392. **Resins Obtained by Heating a Soluble Partially Polymerized Monoalkylfuran and an Aldehyde in an Acid Medium.** A. P. Dunlop, Riverside, and P. R. Stout, Chicago, both in Ill., assignors to Quaker Oats Co., a corporation of N. J.

2,486,399. **Polymeric Polyhydric Alcohol Condensation Products for Conferring Shrinkage-Setting and Other Desirable Characteristics on Cellulosic Textiles.** D. M. Gagarine, Danville, Va., assignor to Dan River Mills, Inc., a corporation of Va.

2,486,419. **Thermoplastic Alkoxyl Lignin Chloride Resins.** R. Katzen, Eugene, Oreg., assignor, by mesne assignments, to Diamond Alkali Co., Cleveland, O.

2,486,487. **Sealing Composition Having Good Electrical Properties and Consisting of Asphalt, a Polymer of Normal Butyl Methacrylate, and a Cetyl Acetamide Wax.** W. P. Lowden, Pitman, N. J., assignor to Radio Corp. of America, a corporation of Del.

2,486,657. **Polymeric Isomeric Butadiene Phosphonic Acids.** G. M. Kosolapoff, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,486,658. **Preparation of Polyphosphoric Acid Esters.** G. M. Kosolapoff, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,486,659. **Catalytic Process for Preparing Acrylic Acid Nitrile.** P. Kurtz, Leverkusen-Wiesdorf, Germany; vested in the Attorney General of the United States.

2,486,665. **Coating Composition Including an Alkyd Resin and an Alkoxy Methylolmelamine.** P. E. Marling, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,486,720. **Improving the Adhesion of Rubber to Cellulosic Fibrous Material Containing Esterifiable Hydroxyl Groups.** F. S. Perkerson, assignor, by mesne assignments, to Callaway Mills Co., both of La Grange, Ga.

2,486,756. **Aqueous Emulsion Adhesive Composition Containing Polystyrene Resin, Plasticizer, a Water-Soluble Emulsifying Agent and Sodium Silicate.** J. F. Murphy, Springfield, Mass., and R. Omdahl, St. Paul, Minn., assignors to Monsanto Chemical Co., St. Louis, Mo.

2,486,782. **Composition Including Depolymerized Rubber, a Powdered Filler, a Pore Inhibitor from the Group of Calcium Oxide and Phosphorous Pentoxide.** K. V. Hardman, Montclair, N. J.

2,486,804-805. **Coating Composition for Cellulosic Textile Material, Including an Aqueous Solution of a Solid Polyethylene Glycol and a Styrene-Maleic Anhydride Resin.** R. B. Seymour and G. M. Schroder, assignors to H. H. Frede & Co., all of Chattanooga, Tenn.

2,486,839. **Copolymers of Vinyl Esters of Low Molecular Weight Carboxylic Acids with Polyalkyl Esters of Aconitic Acid.** P. L. Gordon, New York, assignor to American Waterproofing Corp., Brooklyn, both in N. Y.

2,486,855. **Aqueous Emulsion Polymerization of Vinyl Esters of Saturated Aliphatic Acids.** E. Lavin and C. L. Boyce, assignors to Shawinigan Resins Corp., all of Springfield, Mass.

2,486,923-924. **Acid-Resistant Polymers.** P. H. Carnell, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Del.

2,486,943. **Polymerization of a Solution of an Unsaturated Compound from the Group of Isopropenyl Methyl Ketone, Methyl Methacrylate and Acrylonitrile, in an Aqueous Solution Containing Calcium Thiocyanate.** I. P. Hammer, Verona, and J. B. Rust, East Hanover, assignors, by direct and mesne assignments, of one-half to Montclair Research Corp., Montclair, all in N. J., and one-half to Ellis-Foster Co., a corporation of N. J.

2,486,971. **For Coating Surfaces of Molded Polystyrene, a Lacquer Including Ethyl Cellulose and a Binary Cyclohexanone-Formaldehyde Condensation Resin.** E. O Ohlmann, Ann Arbor, assignor to Dow Chemical Co., Midland, both in Mich.

2,486,992-993. **Organo-Silicon Compounds.** F. J. Sowa, Cranford, N. J.

2,487,060. **Barrier Coat for Adhesive Sheets, Including Major Proportions of Calcium Carbonate Filler and a Copolymer of Butadiene and Styrene, and Minor Proportions of Compatible Coumarone-Indene Resins and Fluid Plasticizer.** C. O. Pike and V. N. Morris, Highland Park, both in N. J., assignors to Industrial Tape Corp., a corporation of N. J.

2,487,074. **In Compounding a Copolymer of a Conjugated Diolefin and Styrene, the Addition of an Oil-Soluble Reaction Product of an Inorganic Cuprous Salt and a Tertiary Aliphatic Mercaptan Fraction to Accelerate Vulcanization.** W. A. Schulze and W. W. Crouch, both of Bartlesville, Okla., assignors to Phillips Petroleum Co., a corporation of Del.

2,487,099. **Improving the Properties of Polymerized Alpha-Chloro Substituted Ethylene by Intimately Incorporating $NaBO_2.H_2O_2.3H_2O$ after Polymerization.** C. J. Chaban, assignor, by mesne assignments, to Stabelan Chemical Co., both of Toledo, O.

2,487,184. **Purification of Butadiene.** W. H. Rupp, Mountainside, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,487,223. **Thermosetting, Initially Thermoplastic Adhesive Composition Including in Solution in an Inert Solvent, Formaldehyde, an Acidic Catalyst and a Polyvinyl Butyral.** M. E. Cupery, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,487,254. **For Protecting the Surfaces of Methyl Methacrylate or Plastic Glass during Shipping, Handling, Storage, Etc., a Strippable Coating Formed from an Aqueous Suspension of Castor Oil-Plasticized Water-Insoluble Polyvinyl Acetal Resin.** P. L. Mahoney, Jackson Heights, assignor to United States Rubber Co., New York, both in N. Y.

2,487,263. **Coagulating Synthetic Rubber Latices by Mixing with an Aqueous Solution Consisting of Water, Sulfuric Acid, and Glue.** W. J. Mueller, Charleston, W. Va., assignor to United States Rubber Co., New York, N. Y.

2,487,278. **Cold Resistant Vulcanizate of a Synthetic Rubber of Isobutylene and Copolymerized with a Conjugated Diolefin at between —50 and —165° C. by a Friedel-Crafts Catalyst; the Vulcanizate Contains an Ester of Phosphoric Acid from the Class Dioctyl Phosphate and Trioctyl Phosphate.** W. C. Smith, Westfield, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,487,309. **Preparation of a Phenol-Formaldehyde-Type Resin from the Solid Coal Tar Distillate, "Red Oil."** A. Champagnat and R. Willer, assignors to Societe Generale des Huiles re Petrole, all of Paris, France.

2,487,338. **Condensation of Aromatic Hydrocarbons with Terpenes.** G. C. Johnson and J. Kellett, III, both of Woodbury, N. J., assignors to Socony-Vacuum Oil Co., Inc., a corporation of N. Y.

2,487,394. **Urea-Formaldehyde-Furfuryl Alcohol Resins.** R. F. Stierli, Newton, N. J., assignor to Harvel Research Corp., a corporation of N. J.

2,487,746. **Phonograph Record Composition Containing, as a Binder, Shellac and Coumarone-Indene Resin.** L. A. Wood, Jr., and W. P. Miller, both of Indianapolis, Ind., assignors to Radio Corp. of America, a corporation of Del.

2,487,766. **Adhesive Containing Sodium Salt of Carboxymethylcellulose and Urea of Melamine Formaldehyde.** C. H. Schmidt, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,487,859. **As a New Composition of Matter, a Polymer of Acrylonitrile Containing in the Polymer Molecule at Least 80% by Weight of Acrylonitrile Dissolved in an Organic Phosphorus Compound.** J. B. Dickey, T. E. Stamin, and H. W. Coover, Jr., assignors to Eastman Kodak Co., all of Rochester, N. Y.

2,487,864. **Linear Polyvinyl Acetals.** C. W. Gayler, Ridley Park, Pa., assignor to American Viscose Corp., Wilmington, Del.

2,487,879. **Polymers of Dialkenyl Acetals.** W. O. Kenyon and T. F. Murray, Jr., assignors to Eastman Kodak Co., all of Rochester, N. Y.

2,487,885. **Copolymer Obtained by Polymerizing in the Presence of a Peroxide Catalyst a Mixture of Beta Propionolactone and a Compound Containing a Polymerizable —CH=C< Group.** J. E. Magoffin and H. J. Hagemeyer, Jr., both of Kingsport, Tenn., assignors to Eastman Kodak Co., Rochester, N. Y.

2,487,898. **Terpene Resins.** A. L. Rummelsburg, assignor to Hercules Powder Co., both of Wilmington, Del.

2,488,034. **Flame-Resistant Material from Guanyl Urea Phosphate Heated with Formaldehyde to Obtain a Slightly Viscous Condensation Product and Then Further Polymerizing by Heat after Impregnation on a Textile Fabric n the Presence of a Melamine Formaldehyde Resin and Stearoyl Oxymethyl Pyridinium Chloride.** R. A. Pingree, Cranston, and R. C. Ackerman, Providence, both in R. I., assignors, by mesne assignments, to Sun Chemical Corp., New York, N. Y.

2,488,149. **Emulsion Polymerization of Diolefins in the Presence of an Alkyl Ethanolamine Soap.** B. M. Vanderbilt, Westfield, N. J., and F. Bascom, Staten Island, N. Y., assignors to Standard Oil Development Co., a corporation of Del.

2,488,186. **Preparing Phenolic Material from a Lignin Substance.** D. H. Grangaard, assignor, by mesne assigments, to Sulphite Products Corp., both of Appleton, Wis.

2,488,332. **Phenolic Resin Metal Containing Molding Composition.** W. P. Rousch, Pittsburgh, Pa.

2,488,428. **Polyhydroxybenzene Formaldehyde Resin Adhesives.** F. J. Nagel, Emlenton, assignor to Westinghouse Electric Corp., East Pittsburgh, both in Pa.

2,488,449. **Organo-Silicon-Phosphorus Product of Reaction between Sodium Methyl Octadecyl Phosphate and Dimethyl-Dichloro-Silane.** C. E. Trautman, Cheswick, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa.

2,488,487. **Alkyl Silicon Halide.** A. J. Barry, Midland, and L. De Pree, Holland, assignors to Dow Chemical Co., Midland, both in Mich.

2,488,495. **Condensation of Resorcinol, Formaldehyde and Methanol.** A. Malashevitz, Dunellen, N. J., assignor to Catalic Corp. of America, a corporation of Del.

2,488,502. **Polymerization of Styrene in Aqueous Emulsion in Conjunction with Potassium Persulfate, a Sodium Salt of Mahogany Acids, Sodium Bicarbonate, and Dodecyl Mercaptan.** H. F. Park, East Longmeadow, and C. H. Basdekis and R. I. Dunlap, Jr., both of Springfield, both in Mass., assignors to Monsanto Chemical Co., St. Louis, Mo.

2,488,503. **Polymerizing Styrene in Aqueous Emulsion in Conjunction with Potassium Persulfate, Sodium Stearate, Sodium Hydroxide, and Dodecyl Mercaptan.** H. F. Park, East Longmeadow, and C. H. Basdekis and R. I. Dunlap, Jr., both of Springfield, both in Mass., assignors to Monsanto Chemical Co., St. Louis, Mo.

2,488,651. **Hydroxylated Vinyl Resin Reacted with Chromium Trioxide and Phosphoric Acid.** L. R. Whiting, East Orange, N. J., and M. V. Goodyear, Pittsburgh, Pa., assignors to Bakelite Corp., a corporation of N. J.

2,488,690. **Aqueous Emulsion Polymerization of Butadiene and Styrene in the Presence of a Catalyst Combination Composed of Diazoaminobenzene Mixed with an Activating Compound from the Group of Hydroquinone, Monochlorohydroquinone, p-Quinone, Pyrogallol, Quinhydrone, Dichlorohydroquinone, and Catechol.** W. N. Stoops, Charleston, W. Va., assignor to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,488,736. **Rubbery Polymers Obtained from Monoolefin and a Diolefin with the Aid of**

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for vinyl and rubber surfaces

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V-ELASTI-CALS: The answer to full-color decoration and brand marking on vinyl surfaces—aprons, purses, upholstering materials, curtains, coasters, seat covers, gun cases, etc. V-Elasti-cals are readily adaptable to canvas or duck—for footwear, sporting goods, outdoor clothing. Quickly applied by hand or steam press. Both R- & V-Elasti-cals can be produced in any design, size, or number of colors. Write for FREE samples and details of our technical consultation service. Address Dept. 12-1.

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Friedel-Crafts Catalysts Dissolved in Water Containing Alkyl Halide Solvents. F. A. Palmer, Wooster, Tex., assignor, by mesne assignments, to Standard Oil Development Co., Elizabeth, N. J.

2,488,883. **Polymers of the Condensation Product of Formaldehyde with Unsaturated Esters of Ketocarboxylic Acids.** E. C. Shokal, Oakland, and P. A. Devlin, assignors to Shell Development Co., both of San Francisco, both in Calif.

2,488,975. **Retarding the Deterioration of Natural and Synthetic Rubbers by Incorporation of an Antimonyl Polyhydric Phenol Containing Orthodihydroxy Grouping.** B. A. Hunter, Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.

2,489,000. **Uncured Butadiene-Styrene Copolymer Containing from 0.1 to 5% of an N-(Hydroxyphenyl) Pyrrole.** F. R. Valentine, Jr., Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.

2,489,091 **Organic Phosphorous Compounds.** M. S. Kharasch, Chicago, Ill., assignor to United States Rubber Co., New York, N. Y.

2,489,138. **Siloxanes.** J. F. Hyde and W. H. Daudt, assignors to Corning Glass Works, all of Corning, N. Y.

2,489,142-143. **Fractionation Process for Preparing Cellulose Acetate Material Productive of Substantially Colorless Plastics of Optical Clarity.** J. W. Kneisley, New Brunswick, N. J., assignor to Hercules Powder Co., Wilmington, Del.

2,489,145. **Hardenable Urea-Aldehyde Condensate Combined with a Curing Catalyst Including an Organo-Boron Trihalide Complex Formed by Adding Boron Trifluoride to Phenol.** D. J. Lieb and L. E. Clark, Jr., both of Bainbridge, N. Y., and R. J. Spahr, New Brunswick, N. J., assignors to Borden Co., New York, N. Y.

2,489,181. **Condensation Product from Acrylonitrile and Dicyandiamide.** I. Hechenbleikner, Norwalk, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,489,225. **Insolubilization of Thermoplastic Ethers and Esters of Cellulose.** E. K. Morris, assignor to Dow Chemical Co., both of Midland, Mich.

2,489,226. **Pigmented Polystyrene.** E. D. Morris and S. S. Drake, assignors to Dow Chemical Co., all of Midland, Mich.

Dominion of Canada

460,232. **Resinous Condensation Product of Phosphonitrillic Chloride and Urea.** F. G. Ciapetta, Yeadon, assignor to Atlantic Refining Co., Philadelphia, both in Pa., U.S.A.

460,233. **Copolymerizing an Alpha Alkyl Styrene with an Aliphatic Iso-Olefin of not More Than 5 Carbon Atoms or a Conjugated Diolefin of not More Than 6 Carbon Atoms.** A. B. Hersberger, Drexel Hill, and T. D. Waugh, Lansdowne, assignors to Atlantic Refining Co., Philadelphia, all in Pa., U.S.A.

460,234. **Rubber-Like Polymers from a Mixture of Isobutylene and Isoprene.** A. B. Hersberger, Drexel Hill, assignor to Atlantic Refining Co., Philadelphia, both in Pa., U.S.A.

460,257. **Polymerization of Monomeric Vinyl Ester.** M. M. Brubaker, Boothwyn, and R. A. Jacobson, Landenberg, Pa., U.S.A., assignors to Canadian Industries, Ltd., Montreal, P.Q., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U.S.A.

460,258. **Emulsion Polymerization of Methyl Methacrylate.** M. M. Brubaker, Boothwyn, and R. A. Jacobson, Landenberg, both in Pa., U.S.A., assignors to Canadian Industries, Ltd., Montreal, P.Q., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U.S.A.

460,259. **Copolymerization of Acrylonitrile with a Monounsaturated Ester of a Monocarboxylic Acid.** M. M. Brubaker, Boothwyn, and R. A. Jacobson, Landenberg, both in Pa., U.S.A., assignors to Canadian Industries, Ltd., Montreal, P.Q., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., U.S.A.

460,265. **Expanded Thermoplastic Resinous Material.** A. Cooper and D. E. Partington, assignors to Expanded Rubber Co., Ltd., all of Croydon, England.

460,270. **Polymerization of N-Vinyl Pyrrole Compounds by Dissolving in a Di-Halogenated Alkyl Compound and Subjecting the Solution to the Action of an Acid-Reacting Condensation Catalyst.** D. E. Sargent, Easton, Pa., assignor to General Aniline & Film Corp., New York, N. Y., both in the U.S.A.

460,271. **Foils and Films of Polymeric N-Vinyl Pyrrole Compounds.** M. T. Orinik, Binghampton, assignor to General Aniline & Film Corp., New York, both in N. Y., U.S.A.

460,284. **Heat-Set Resin Which Is the Reaction Product of a Monohydric Phenol-Aldehyde Resin and the Chemical Addition Product of Hexamethylenetetramine and Resorcinol.** P. H. Rhodes, Kingston, N. Y., assignor to Pennsylvania Coal Products Co., Petrolia, assignor to Koppers Co., Inc., Pittsburgh, both in Pa., both in the U.S.A.

460,285. **Heat Reactive Resinous Product from Resorcin and an Oil.** A. J. Norton, Seattle, Wash., assignor to Pennsylvania Coal Products Co., Petrolia, assignor to Koppers Co., Inc., Pittsburgh, both in Pa., both in the U.S.A.

460,286. **Heat-Reactive Adhesive Carrier Film for Hot Pressing Work Impregnated with an Aqueous Solution of a Hexamethylenetetramine and a Dihydroxy Benzene-Aldehyde Resin.** P. H. Rhodes, East Hampton, N. Y., assignor to Pennsylvania Coal Products Co., Petrolia, assignor to Koppers Co., Inc., Pittsburgh; both in Pa., U.S.A.

460,287. **Accelerating the Setting Properties of a Dihydroxy Benzene-Aldehyde Adhesive by Applying a Liquid Alkaline Hardening Accelerating Solution.** P. H. Rhodes, East Hampton, N. Y., assignor to Pennsylvania Coal Products Co., Petrolia, assignor to Koppers Co., Inc., Pittsburgh, both in Pa., both in the U.S.A.

460,312. **Polymerizing in Aqueous Emulsion a Methylpentadiene in the Presence of a Diazoaminoaryl Compound.** E. T. Bishop, Berkeley, assignor to Shell Development Co., San Francisco, both in Calif., U.S.A.

460,392. **Product Obtained by Simultaneously Esterifying Maleic Acid or Fumaric Acid with a Glycol and a Branch Chain Unsaturated Alcohol.** E. L. Kropa, Old Greenwich, and T. F. Bradley, Stamford, both in Conn., assignors to American Cyanamid Co., New York, N. Y., both in the U.S.A.

460,393. **Product Obtained by Simultaneously Esterifying a Maleic Acid or a Fumaric Acid with a Glycol and Straight Chain Unsaturated Alcohol Having a Terminal Double-Bond.** D. G. Patterson, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y., both in the U.S.A.

460,412. **Copolymer of Isopropenyl Acetate and Vinyl Chloride.** R. L. Hasche and E. M. McMahon, both of Kingsport, Tenn., U.S.A., assignors to Canadian Kodak Co., Ltd., Toronto, Ont.

460,433. **Dialkylated Silicon Esters.** R. R. McGregor, Verona, and E. L. Warrick, Pittsburgh, both in Pa., assignors to Corning Glass Works, Corning, N. Y., both in the U.S.A.

460,438. **In the Polymerization of Vinyl Chloride or Vinylidene Chloride in Aqueous Medium in the Presence of an Organic Peroxide Catalyst, the Step of Adding a Non-Polymerizable Unsaturated Chlorinated Lower Aliphatic Hydrocarbon.** H. P. Staudinger, Ewell, and B. K. Kelly, London, both in England, assignors to Distillers Co., Ltd., Edinburgh, Scotland.

460,470. **Formed Sheets of a Polymer of a Diallyl Ester.** I. E. Muskat, Akron, O., assignor to Pittsburgh Plate Glass Co., Pittsburgh, Pa., both in the U.S.A.

460,576. **Resinous Condensation Product from Oxidized Rubber, a Phenol, Formaldehyde and a Basic Catalyst.** F. J. W. Popham, New Barnet, assignor to British Rubber Producers' Research Association, London, both in England.

460,627. **Infusible, Heat Non-Convertible, Highly Condensed and Polymerized Plastic Mass of Limited Thermoplasticity.** F. J. Myers, assignor to Resinous Products & Chemical Co., assignor to Rohm & Haas Co., all of Philadelphia, Pa., U.S.A.

460,647. **Cured Synthetic Rubber Obtained by Heating with Benzoyl Peroxide, a Fusible Ethylene Glycol-Isopropylene Glycol-Sebacic Acidmaleic Polyester.** C. S. Fuller, Chatham, N. J., assignor to Bell Telephone Laboratories, Inc., assignor to Western Electric Co., Inc., both of New York, N. Y., both in the U.S.A.

460,651. **Moisture-Proof, Heat-Sealing Films from Cellulose Acetate Film Coated with a Composition Containing Cyclized Rubber, a Wax, a Resin Gum and an Antioxidant Dissolved in a Volatile Solvent.** B. Andersen, Newark, N. J., assignor to C. Dreyfus, New York, N. Y., both in the U.S.A.

United Kingdom

629,103. **Curing Molding Compositions.** E. Hene.

629,137. **Copolymer of Vinylidene Chloride.** Dow Chemical Co.

629,138. **Alkylorthosilicates.** British Thomson-Houston Co., Ltd.

629,142. **Stabilized Vinyl Halide Compositions.** B. F. Goodrich Co.

629,145. **Rubber-Like Compositions.** Harvel Corp.

629,161. **Synthetic Resin Products.** N. V. Philips Gloeilampenfabrieken.

629,196. **Piperidine Derivatives.** Roche Products, Ltd.

629,320. **Resinous Material.** Monsanto Chemical Co.

629,330. **Composition for Automatically Sealing Punctures in Pneumatic Tires.** A. W. and C. E. Dickeson.

629,332. **Stabilized Synthetic Polymers.** British Thomson-Houston Co., Ltd.

629,408. **Artificial Thermosetting Resin.** Quaker Oats Co

629,452. **Coloring Highly Polymeric Linear Esters.** Imperial Chemical Industries, Ltd., F. Hardwick, and E. Waters.

629,469. **Cellulose Styrene Compositions.** Standard Telephones & Cables, Ltd.

629,481. **Resinous Materials.** Harvel Research Corp.

629,483. **Organosilicon Amines.** Corning Glass Works.

629,486. **Dimethyl Silicone Gums.** British Thomson-Houston Co., Ltd.

629,490. **Oil-Modified Alkyd Resins.** Imperial Chemical Industries, Ltd., D. Atherton, and J. K. Lovell.

629,491. **Monochloromethylpenta - Methyl-Siloxane.** Dow Corning Corp.

629,537. **Nitrogen and Sulfur Containing Beta-Substituted Carboxylic Acids.** B. F. Goodrich Co.

629,584. **Synthetic Resins.** J. E. Lennard-Jones, F. G. Wilson, J. Pearson, F. A. Paine, and J. Vaughan.

629,642. **Dimethyl Silicone Gums.** British Thomson-Houston Co., Ltd.

629,663. **Dispersion of Rubber Latex Compounding Ingredients.** Firestone Tire & Rubber Co.

629,668. **Cellular Thermoplastic Materials.** Telegraph Construction & Maintenance Co., Ltd., H. F. Wilson, and D. E. Partington.

629,695. **Preparation of High-Viscosity Polyvinyl Alcohol.** Shawinigan Resins Corp.

629,719. **Mono-Chloromethyl Silicon Chlorides.** Dow Corning Corp.

629,787. **Coating Compositions Containing Synthetic Resins.** Westinghouse Electric International Co.

630,022. **Interpolymers of Styrene with Polymeric Fatty Acid Esters and Coating Compositions Obtained therefrom.** L. Berger & Sons, Ltd., L. E. Wakeford, and F. Armitage, and R. H. Buckle and E. Booth, legal representatives of D. B. Hewitt, deceased.

630,140. **Adhesive Resinous Compositions.** B. F. Goodrich Co.

630,162. **Alkali and Acid Resistant Polyamine-Modified Phenol-Formaldehyde Resins.** Bakelite Corp.

630,258. **Synthetic Resins.** Mississippi Valley Research Laboratories.

630,319. **Compositions Containing Polymeric Silicones.** Westinghouse Electric International.

630,334. **Coating Compositions.** E. I. du Pont de Nemours & Co., Inc.

630,338. **Plasticized Polymeric Vinyl Halide Compositions.** B. F. Goodrich Co.

630,362. **Rubber-Like Polymers.** J. C. Arnold. (Standard Oil Development Co.).

630,370. **Polymerizable Materials.** Imperial Chemical Industries, Ltd., and R. Hammond.

630,445. **Polysiloxane Resins.** British Thomson-Houston Co., Ltd.

630,484. **Polymerization Process.** Phillips Petroleum Co.

630,488. **Setting Compositions.** Dunlop Rubber Co., Ltd., and M. Goldstaub.

630,489. **Stabilizing Sulfur-Containing Organic Compounds against Oxidation and Setting Compositions Produced therefrom.** Dunlop Rubber Co., Ltd., and M. Goldstaub.

630,606. **Fluorocarbons and Fluorohydrocarbons.** W. N. Haworth, F. Smith, and E. V. Appleton.

630,610. **Acylated Esters of Hydroxy-Substituted 18 Carbon Atom Aliphatic Monocarboxylic Acids.** B. F. Goodrich Co.

630,611. **Polymerizing Unsaturated Monomeric Organic Materials.** B. F. Goodrich Co.

630,618. **Melamine Resins.** British Industrial Plastics, Ltd.

630,625. **Linear Polythioesters.** Wingfoot Corp.

630,644. **Preparation of Tetramethyl Silicate.** British Thomson-Houston, Ltd.

630,647 and 630,663. **Adhesives for Adhesively Uniting Materials, Especially Metals.** Ciba, Ltd.

630,700. **Synthetic Resin Compositions.** Continental Can Co.

630,724. **Resolution of Azeotropic Mixtures of Chlorosilanes.** British Thomson-Houston, Co., Ltd.

630,883. **Silicone Compositions.** British Thomson-Houston Co., Ltd.

630,892. **Siloxane Resins.** Dow Corning Corp.

630,924. **Alkyd Resins.** Bakelite Corp.

630,951. **Organo-Silicon Esters.** J. G. Fife (Dow Corning Corp.).

630,952. **Organo-Silicon Alcohols.** J. G. Fife (Dow Corning Corp.).

630,955. **Adhesive Compositions.** A. H. Stevens (Minnesota Mining & Mfg. Co.)

630,992. **Preparation of Linear Polyesters.** Wingfoot Corp.

631,002. **Compounds of Alginic Acid and Its Derivatives.** Alginate Industries, Ltd., J. B. Speakman, N. H. Chamberlain, and C. M. C. Dorkin.

631,006. **Stabilized Synthetic Polymers.** British Thomson-Houston Co., Ltd.

631,018. **Organo-Dihaloenosiloxanes.** British Thomson-Houston Co., Ltd.

631,020. **Polyamides.** British Celanese Ltd.

631,049. **Organo Silicon-Alcohols.** J. G. Fife (Dow Corning Corp.).

631,055. **Solutions of Polyvinyl Derivatives.** Soc Rhodiaceta.

631,109. **Artificial Thermosetting Resin.** Quaker Oats Co.

631,117. **Polymers and Copolymers of Fumaric Acid Diesters.** J. C. Arnold (Standard Oil Development Co.).

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- Tailored for specific needs
- Widely compatible with other compounding ingredients
- Economical
- Uniform quality

This chart describes some of our products and their uses

TRADE NAME	CHEMICAL COMPOSITION	RECOMMENDED FOR USE IN	USE DATA
"Dutch Boy" Tribase	Tri-basic Lead Sulphate	Electrical compounds	Generally used in combination with DS-207. Works best with organic ester type plasticizers.
"Dutch Boy" Tribase E	Basic Lead Silicate Sulphate Complex	Insulated wire	Lowest volume cost stabilizer especially recommended for electrical compounds.
"Dutch Boy" DS-207	Di-basic Lead Stearate	Sheeting, extrusion and molded compounds, i.e. insulated wire and vinyl phonograph records	Generally used with Plumb-O-Sil B and Tribase. Good for electricals. Adds lubricity and stabilization. Excellent alone as stabilizer and lubricant for rigid vinyl moldings.
"Dutch Boy" Plumb-O-Sil A	Co-precipitate of Lead Orthosilicate and Silica Gel	Sheeting and upholstery stocks	Easy processing. Gives a high degree of translucence.
"Dutch Boy" Plumb-O-Sil B	Co-precipitate of Lead Orthosilicate and Silica Gel	Translucent film and sheeting, belting	For translucent compounds and bright colors, minimizes spewing.
"Dutch Boy" Plumb-O-Sil B Electrical Grade	Co-precipitate of Lead Orthosilicate and Silica Gel	Insulated wire	Low volume cost, excellent electrical characteristics.
"Dutch Boy" Dythal	Di-basic Lead Phthalate	Electrical stocks and opaque films	General purpose stabilizer for heat and light.
"Dutch Boy" Dyphos	Di-basic Lead Phosphite	All opaque stocks including Plastisols and Organosols	Excellent for heat and light with organic ester and polymeric type plasticizers; anti-oxidant stabilizer; useful with chlorinated paraffin extenders. Generally used with DS-207.
"Dutch Boy" Normasal	Normal Lead Salicylate	Vinyl flooring compounds. Rubber stocks as non-scorch activator	Useful in small amounts with phosphate type plasticizer. Antioxidant stabilizer.

"Dutch Boy" CHEMICALS

NATIONAL LEAD COMPANY, 111 Broadway, New York 6, N. Y.

MACHINERY

United States

2,486,666. **Hand Tool for Inserting Rubber Strip.** C. A. Maudlin, Ponca City, Okla.

2,486,758. **Apparatus for Working Sheet Material.** F. B. Pfeiffer, Akron, O., assignor of one-half to J. R. Crossan.

2,486,759. **Machine for Wrapping Objects in Heat-Stretchable and Heat-Sealable Material.** F. B. Pfeiffer, Akron, O., assignor of one-half to J. R. Crossan.

2,486,761. **Apparatus for Working Sheet Material.** F. B. Pfeiffer, Akron, O.

2,486,763. **Apparatus for Making Flexible Tubes.** R. E. Roberts, Ridgefield, Conn.

2,487,122. **Apparatus for Forming a Collapsible Partition Structure for an Inflatable Article.** J. M. Flore and J. A. Weber, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,487,149. **Adhesive Sheet Material Splicer.** C. W. Leguillon, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,487,153. **Apparatus for Making Belts.** R. E. Lindemann, Barberton, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,487,196. **Loading Apparatus for Supplying Cemented Drums to a Tire-Building Machine.** F. S. Sternad, Cuyahoga Falls, and J. P. Sapp, Kent, both in O., assignors to B. F. Goodrich Co., New York, N. Y.

2,487,426. **Injection Molding Apparatus.** W. P. Cousino, Detroit, assignor to Chrysler Corp., Highland Park, both in Mich.

2,487,495. **Plastic Sheet Folding Machine.** R. F. Taber, Buffalo, N. Y.

2,487,910. **Extrusion Equipment.** C. C. Waddell, Aruba, Netherland West Indies, and H. H. Vickers, Union, and W. W. Waterman, Cranford, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,488,141. **Film Processing Device.** V. E. Pratt and G. F. Gray, both of Norwalk, Conn.

2,488,142. **Apparatus for Automatically Processing Film.** V. E. Pratt, G. F. Gray, and D. E. Reed, also of Norwalk, Conn.; Gray and Reed assignors to Pratt.

2,488,189. **Machine for Mixing, Milling, and Extruding Plastic Materials.** A. W. Hanson, assignor to Dow Chemical Co., both of Midland, Mich.

2,488,344. **Mechanism for Forming, Distributing, and Conveying Blocks of Plastic Material.** G. A. Stonestreet, Richmond, and H. R. Sait, Northholt, assignors to T. Wall & Sons, Ltd., London, all in England.

2,488,576. **Apparatus for Extruding Material around a Plurality of Continuously Advancing Conductors.** G. E. Berggren, Baltimore, Md., assignor to Western Electric Co., Inc., New York, N. Y.

2,488,595. **Apparatus for Plasticizing and Straining Plastic Material.** G. E. Henning, Baltimore, Md., assignor to Western Electric Co., Inc., New York, N. Y.

2,488,761. **Cord Flexing Machine.** C. B. Budd, Akron, O., and L. Larrick, Charlottesville, Va., assignors to B. F. Goodrich Co., New York, N. Y.

2,488,786. **Injection Molding Machine.** A. S. Watkins, Walpole, N. H., assignor, by mesne assignments, to Produx Corp., Port Clinton, O.

2,488,863. **Apparatus for Building Pneumatic Tires.** J. I. Haase, assignor to Wingfoot Corp., both of Akron, O.

2,488,935. **Vulcanizer.** D. G. Rempel, Akron, assignor to Sun Rubber Co., Barberton, both in O.

2,488,997. **Apparatus for Cooling Sheet Material.** H. A. Thornburg, Brooklyn, assignor to United States Rubber Co., New York, both in N. Y.

Dominion of Canada

460,002-003. **Torch to Weld Thermoplastic Material.** W. M. Phillips, Jr., assignor to Udylite Corp., both of Detroit, Mich., U.S.A.

460,004. **Apparatus for Plasticizing Vulcanized Conjugate Diolefin Polymer Material.** J. C. Elgin, Princeton, N. J., and E. F. Sverdrup, assignors to U. S. Rubber Reclaiming Co., Inc., both of Buffalo, N. Y., both in the U.S.A.

460,111. **Mold for Molding a Sealing Element Directly upon a Series of Spaced-Apart Fastener Elements.** C. P. Krupp, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y., both in the U.S.A.

460,177. **Device to Make Cast Film.** A. J. Seitz, assignor to Wingfoot Corp., both of Akron, O., U.S.A.

460,371-372. **Apparatus for Making Plastic Wheel Trim.** G. A. Lyon, Allenhurst, N. J., U.S.A.

460,966. **Cable Forming Machine.** E. Bertalan, Oak Park, Ill., and J. A. Wagner, Cleveland Heights, O., assignors to Western Electric Co., Inc., New York, N. Y., all in the U.S.A.

UNCLASSIFIED

United States

2,485,871. **Device for Testing and Winding up an Electrical Conductor Cable Covered with Insulation.** J. L. Entwistle, Cranston, assignor to James L. Entwistle Co., Pawtucket, both in R. I.

2,485,975. **Hose End Fitting.** B. A. Main, Jr., assignor to Aeroquip Corp., both of Jackson, Mich.

2,485,976. **Hydraulic Connector for Flexible Hose.** D. W. Main, assignor, by mesne assignments, to Aeroquip Corp., both of Jackson, Mich.

2,486,084. **Tool for Pulling an Inner Tube Valve Stem through a Valve Stem Receiving Hole in a Tire Rim.** F. D. Webster, Wateska, Ill.

Dominion of Canada

459,994. **Apparatus for Inserting a Cylindrical Inner Bearing Member within a Rubber Bushing.** P. C. Hutton, assignor to Silentbloc, Ltd., both of London, England.

460,116. **Traction Device for Wheeled Vehicles.** B. D. Irvin, Ottawa, Ont., assignor to His Majesty the King in the Right of Canada, represented by the Minister of National Defence, Ottawa, Ont.

United Kingdom

628,724. **Electric Cable Cover Slitter.** J. Lucas, Ltd., and R. J. Whitehouse.

628,861. **Torque Counteracting Rotors for Helicopters.** Firestone Tire & Rubber Co.

629,134. **Vehicle Wheels.** Dunlop Rubber Co., Ltd., and P. B. Chatterton.

629,786. **Vehicle Wheels.** Dunlop Rubber Co., Ltd., and P. B. Chatterton.

629,890. **Pressure Control Devices for Pneumatic Tires.** M. Navarro and E. J. and A. E. Llovet.

TRADE MARKS

United States

511,513. **Nottapinn.** Flush tank balls. Scully Rubber Mfg. Co., Baltimore, Md.

511,519. **Dura Hyde.** Athletic balls. Olympic Sporting Goods Co., Inc., New York, N. Y.

511,524. **Super-Seal.** Inner tubes. United States Rubber Co., New York, N. Y.

511,525. **Hudson's Woodward Shops.** Raincoats. J. L. Hudson Co., Detroit, Mich.

511,684. **Crescent.** Cables. Crescent Co., Inc., Pawtucket, R. I.

511,685. **Crescent Wiry Joe.** Cables. Crescent Co., Inc., Pawtucket, R. I.

511,700. **KeKo.** Baby pants and bibs. Kennedy Car Liner & Bag Co., Inc., Shelbyville, Ind.

511,777. **Dura-Clear.** Plastic film. Harwid Co., Boston, Mass.

511,782. **Wes-Mor.** Shoe and tire cleats. Morrone Mfg. Co., Westerly, R. I.

511,788. **Kwik-On.** Anti-skid chains. Peerless Chain Co., Winona, Minn.

511,807. **Red Seal.** Separator cloth. Joanna Western Mills Co., Chicago, Ill.

511,808. **Blue Seal.** Separator cloth. Joanna Western Mills Co., Chicago, Ill.

511,809. **Gold Seal.** Separator cloth. Joanna Western Mills Co., Chicago, Ill.

511,810. **Warnoseal.** Separator cloth. Joanna Western Mills Co., Chicago, Ill.

511,816. Circle containing representation of Atlas carrying the world on his shoulders, and the words: **"It Holds The World Warranted Atlas Brake Lining."** Brake linings. Atlas Asbestos Co., North Wales, Pa.

511,841. **Panama.** Packing and hose. Van Camp Hardware & Iron Co., Indianapolis, Ind.

511,874. **Safety-Speed.** Tires and tubes. Richmond Rubber Co., Inc., Richmond, Va.

511,876. **Kro-Flite.** Golf balls. A. G. Spalding & Bros., Inc., Chicopee, Mass.

511,897. **Browning Gripbelt.** Belting. Browning Mfg. Co., Maysville, Ky.

511,928. Representation of a streamer containing the word: **"Maxply."** Tennis and badminton rackets. Dunlop Tire & Rubber Corp., Buffalo, N. Y.

511,935. **Linda Alive.** Dolls. Ideal Novelty & Toy Co., Hollis, N. Y.

511,944. **Corsair.** Tires. Goodyear Tire & Rubber Co., Akron, O.

512,063. **Comavar.** Paints, vinyl coatings,

(*Continued on page 478*)

OBITUARY

Herbert J. Long

WHILE attending a sales meeting of the Naugatuck Chemical Division of United States Rubber Co. at Naugatuck, Conn., of which he was technical representative in the Chicago and Detroit area, Herbert J. Long died on November 14. He was born in Jamestown, O., January 6, 1891.

Mr. Long's education was acquired in Columbus, O., and Johnstown, Pa., schools and Ohio State University, College of Engineering.

On leaving college he joined the Goodyear Tire & Rubber Co., Akron, O., and two years later was sent to Canada as assistant manager of Canadian Goodyear Tire & Rubber, Ltd. At the beginning of World War I he returned to this country and went to Washington, D. C., to take charge of pyrotechnics in the trench warfare division of Army Ordnance. After the war he joined the Nixon Nitration Works of New Jersey as a division sales manager, a position he held for 19 years. He became associated with Naugatuck in 1937.

A Mason, the deceased was also a member of the Ohio State University "Varsity O" Association, Ohio State Alumni Association, the 25-year Club of the Division of Rubber Chemistry, A. C. S., the Detroit and Chicago Rubber groups, Sigma Alpha Epsilon, and the Episcopal Church.

Mr. Long is survived by his wife, a son, a daughter, a grandson, a brother, and his mother.

F. W. Gaver

THE chief chemist at the Elmhurst Rubber Co., Inc., Elmhurst, L. I., N. Y., F. W. Gaver, died on November 21 of coronary thrombosis. Funeral services and burial were on November 25 at Berryville, Va.

Mr. Gaver was born in Berryville, December 17, 1886. He had been employed by Parker Stearns & Co., Inc., Whitehall Tatum, and Jenkins Valve Co. before coming to Elmhurst on August 14, 1939.

Surviving the deceased are the widow and a brother.

Charles N. Waterman

CHARLES N. WATERMAN, secretary and a director of H. Kohnstamm & Co., Inc., New York, N. Y., died November 27 as the result of a heart attack suffered two weeks before. He was born in New York in 1886.

Mr. Waterman had been in the employ of the chemical manufacturing concern since 1908, when he started as an office boy. Working his way through various positions, he later organized the company's export department and was the director of supplies and materials purchases for years.

Mr. Waterman belonged to the Masons, Palestine Lodge No. 204, F. and A.M., and was its Past Master. He also was a member of Society B'nee Salem.

Funeral services were held November 29 at Riverside Chapel in New York, followed by burial at Evergreen Cemetery.

Mr. Waterman leaves two daughters.

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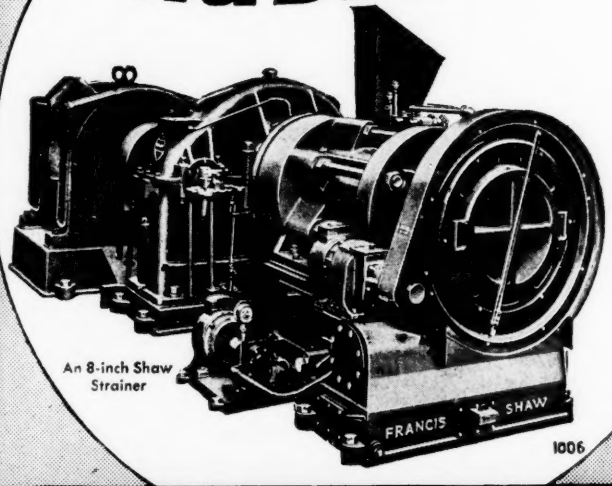

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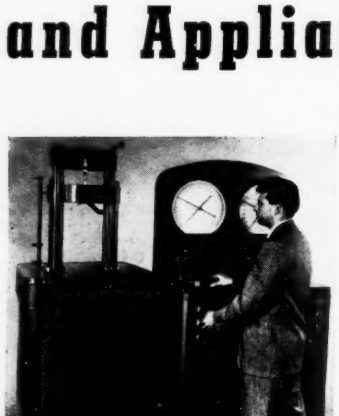


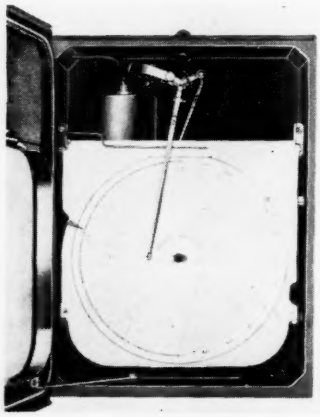
New Baldwin Model 60-H Universal Testing Machine

Universal Testing Machine

DEVELOPMENT of an improved, low-cost universal testing machine, Model 60-H, of 60,000-pound capacity with two ranges has been announced by Baldwin Locomotive Works, Philadelphia 42, Pa. Designed like larger Baldwin machines with hydraulic loading unit separate from the indicating and control unit, the recoil from breaking specimens is isolated, and maximum dial hands can be adjusted with minimum drag. The two-unit design also permits varying their relative positions to suit any requirement.

Other features of the new machine are its exceptionally rigid, two-column design which gives high accessibility in handling specimens and simplifies observations; and loads being applied by an integrated piston and elevating cage consisting of the table, two uprights, and upper gripping head, all of which have a six-inch stroke. A motor drive for positioning the lower gripping head within the loading cage is another new feature and gives a range of 17 inches at 10 inches a minute. Loading controls give infinitely variable speed between zero and two inches a minute. Vertical distance between gripping heads may be one to 18 inches, the latter including the stroke. Clear lateral space between columns is 10 inches. The table is arranged for transverse testing and is drilled to secure standard transverse tools at spans of 12, 18, and 24 inches.

The high range, 60,000 pounds, is graduated in 100-pound units on a 16-inch diameter indicator dial; while the low or 20,000-pound range is graduated in 20-pound units. Bourdon gages for both ranges are precision Emery type, with accuracy within 1% or one dial division, whichever is greater. These gages are connected directly with the loading cylinder. A standard Baldwin recorder can be used with the machine, if desired.



Bristol Series 500 Recording Absolute Pressure Gage

Improved Pressure Gage

THE development of a mechanical-type recording absolute pressure gage said to be based on an entirely new principle has been announced by Bristol Co., Waterbury 91, Conn. The gage has a pressure-sealed lever arm so constructed that it is fractionless, entirely free from lost motion, and free of turning moments owing to changes in differential pressure across the arm. This design makes possible the recording of extremely low absolute pressure ranges.

Known as the Series

500 recording absolute pressure gage, the instrument is available in pressure ranges from 0 to 20 millimeters of mercury and up. Several instruments with the extremely low range of 0 to 6 millimeters mercury absolute pressure have been used successfully.

The new instrument is rugged in construction and can be used under ordinary plant conditions. It gives an accurate record of vacuum in terms of absolute pressure, inherently correct for barometric variations. The instrument is offered as a recorder, as an automatic controller, and for remote measurement and automatic control of absolute pressure.

Folder for Plastic Sheet Materials

New Taber Model 123—90° Thermocreaser

THE Taber Model 123-90° Thermocreaser, an improved production model of its former Thermocreaser, has been announced by Taber Instrument Corp., North Tonawanda, N. Y. The new machine is designed to make right-angle folds on sheet plastic materials used in making rectangular transparent containers and other types of packages. Folds of less than 90 degrees can also be made by either adjusting the temperature of the folding blade or altering the shape of the groove in the folding die. The new model can also be used for line embossing of sheet plastic, imitation leather, genuine leather, and other similar materials.

Improved features of this bar creaser include a toggle linkage that provides faster travel of the blade and better control of folding; ease of operation, since the operator works in a comfortable sitting position and controls the folding cycle by swinging the pedal backward and forward; an adjustable thermoswitch to control automatically the forming blade temperature, together with a dial thermometer indicating the exact temperature; and a metal chilling die to set automatically the fold after forming with the hot blade. This die has a groove on one side for heavy materials, and on the reverse side for folding light materials. The rubber cushion supporting the die can be placed on top of the die for better folding of certain types of materials. The work table, furthermore, has a laminated plastic surface and is metal bound.

SEE PAGE 384

Surface

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The routine use of CAMBRIDGE Surface Pyrometers takes the guesswork out of temperature determination in many industries. The CAMBRIDGE is accurate, dependable, rugged, quick-acting and easy to use. The Roll Model is for checking surface temperatures of still or moving rolls. The Needle Model is for insertion into materials in a plastic or semi-plastic state for within-the-mass temperature determination. The Mold Model is for checking surface temperatures of mold cavities and surfaces of almost any contour.

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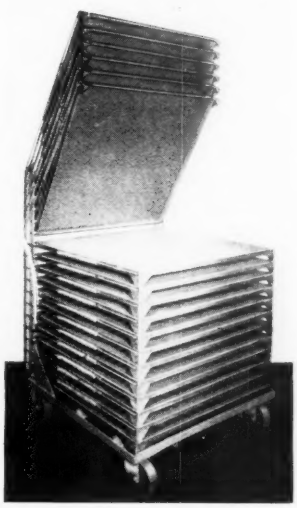

This new Rack gives unobstructed access to three sides of each tray and offers a convenient method for storing materials that require cooling or air drying. The one piece construction Trays are spring supported and can be quickly raised or lowered, free from all locking devices. Racks having 18 perforated trays 36″ x 36″ or plain surface trays 36″ deep by 4 ft., 6 ft. and 8 ft. long, can be furnished either stationary or mounted on casters.

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EUROPE

NETHERLANDS

Annual Report of the Rubber Foundation

The annual report of the Rubber Foundation for 1948 again bears testimony to the diversity of the activities of this organization. During the past year it maintained close contact with the Indonesian Rubber Research Institute as well as with foreign rubber institutions. In the course of the year many foreign visitors were received; while staff members made trips abroad to study and to attend and deliver lectures.

Activities of the chemico-physical research department centered on rubber hydrochlorides, chlorinated rubber, and cyclized rubber; progress was made on the process involving the addition of hydrochloric acid to latex; thermal and photochemical stability of rubber hydrochloride films was improved, and a method was developed for working rubber hydrochloride powder into calendered films. Investigations on solubility of cyclized rubber from latex indicated that the basis of the breaking-down reaction of cyclized rubbers is probably an oxidation mechanism differing from that operating in rubber. Some improvements are reported in the preparation of chlorinated rubbers and a good deal of progress in their technical application.

Investigations of emulsion polymerization of rubber latex with certain vinyl compounds were begun, and necessary polymerization apparatus was designed.

Physico-chemical research work included measurements of the permeability to gases of rubbers and Pliofilm, studies of the thermal stability of rubber hydrochlorides, studies on silver nitrate rubber, and on electron model substances for rubber. In the latter connection it was found that the "lone pair" electrons of the nitrogen atom of crystal violet bear a great resemblance to the pi-electrons of the double linkage of rubber, and experiments made with the "electron" model substance for rubber—that is crystal violet and sulfur. Peachey sulfur and chlorine sulfur, led to important conclusions on rubber vulcanization; crystal violet seems to be an accelerator.

Among the numerous analytical investigations are reported determination of unsaturation, determination of chlorine; spectroscopic investigations of rubber, derivatives.

The physical tests included investigations on temperature coefficient of elastic tension, properties of rubber subjected to two-dimensional elongation, dynamical testing, various X-ray investigations.

The chief object of investigation by the technological department was the new GR-S polymerized at 41° F. It was found that this "cold rubber" is easier to process than standard GR-S, behaving more like natural rubber. In a vulcanized carbon-black compound "cold rubber" showed no marked improvement over standard GR-S in abrasion resistance, or to flex-cracking. Tensile strength, however, was better, as were elongation at break (50 to 100% higher) and Shore resilience (75 against 55-60). Accelerated aging tests resulted less favorably for "cold rubber" than for GR-S, and it is added, "sometimes inferior to results with natural rubber." On the other hand the results of load tests (over fixed periods of time) were more favorable for "cold rubber" than for GR-S.

Other synthetic rubbers examined included two "Thiokols," Hycar OS-10, and Geon polyblend—a mixture of polyvinylchloride and Hycar OR.

The department also investigated tensile strength as a function of temperature, improved apparatus for determining impact resilience, conducted new brittle point tests, and studied maleic acid anhydride rubber reaction product as material for ebonite.

Aiming at a cheap rubber-containing material that could compete with linoleum, Elastoleum, a rubber-wood meal product was developed which is said to be moldproof and to have about the same resistance to chemicals as cork linoleum.

The development department is now under J. van Houweninge since A. J. Ultee, former acting director of the department and head of the patent department, resigned. Dr. Ultee however, has consented to continue to lecture at the Foundation on certain special subjects.

With rubber and latex more easily obtainable, the development department was particularly active during 1948, for although the home rubber industry, swamped with orders as it was at the time, showed little interest in new developments, the Foundation had a weather eye out for the signs of over-production abroad that were becoming evident.

The development department is promoting rubber powder in

asphalt for roads, factory floors, and joint fillings; the use of rubber tires and floorings in agriculture; Rupal, a spreadable flooring made from latex;[1] Elastoleum; the Positex process; foam rubber, etc.

Tests are to be conducted to determine the practical value of a patent covering the use of rubber for packing wood for shipment, to protect it from the teredo, and to develop a suitably lined paper bag to take the place of packing cases for plantation rubber. A trial shipment with paper bags holding 50.8 kilograms of sheet and up to 40 kilograms of crepe has already been made and proved encouraging so that 50 more tons of rubber so packed are to be sent to various ports in America and Europe. In time it is planned to be able to replace the paper bag by one of rubber derivative. Meanwhile it is pointed out that the paper bags are cheaper than packing cases, and that a bag holding 40 to 50 kilograms of rubber can be carried by one man; consequently lower shipping and freight charges should result.

[1] See India Rubber World, Aug., 1949, p. 630.

Vredestein Tire Factory

The October issue of *Rubber*, publication of the Rubber Stichting, gives some details about the Vredestein Enschede tire factory, in which The B. F. Goodrich Co. is interested and which J. L. Collyer, Goodrich president, is quoted as having said is "the most modern equipped and organized tire factory of the world."

It is pointed out that while Goodrich cooperated on the construction and equipment of the factory, it is a typically Dutch enterprise, and only 18% of the shares are held by Americans. All the employes are Dutch, and two-thirds of the machines and other equipment are entirely of Netherlands manufacture; only what could not be obtained except from America was imported.

Of the chief basic materials, rubber from Indonesia exclusively, and locally manufactured rayon are employed. The factory, now in production with a daily output of 500 tubes and 500 tires, is already planning new developments and expected to begin manufacture of tubeless tires by the end of 1949.

GREAT BRITAIN

Carbon Black Production Menaced?

Certain British manufacturers of carbon black and lamp black seem to be facing an unexpected difficulty. The Ministry of Health proposes to issue a new draft order extending some of the provisions of the Alkali Works Orders whereby carbon black production works would also become affected. These orders concerned primarily with the health of workers might require full disclosure of manufacturing processes. At a public inquiry held by W. A. Damon, Chief Alkali Inspector, representatives of interests involved entered their protests.

Col. R. H. Studholme, director of Philblack, Ltd., asked that black production works be exempted from the proposed law. He pointed out that manufacturers of carbon black in England had not been consulted, not even his own firm, probably the largest carbon black manufacturer in England. He then went on to state that Philblack had been licensed by an American company to make a particular type of carbon black by a secret American process. The British company was half-way through the construction of works that would cost about £1,000,000 and which were designed to produce carbon black by the process it had undertaken to keep secret. But if the proposal in the draft order became law, the inspectors might require information which the company had contracted not to reveal. If particulars of the process were nevertheless disclosed, the licensors could terminate the license and Philblack, Ltd., would be unable to carry on in England. Discussing health precautions, Colonel Studholme declared that special and very expensive plant had already been designed to prevent pollution of the atmosphere by carbon black, which it would be impossible to redesign if the law imposed new requirements.

Other black manufacturers presented their cases, and when the enquiry ended, it was evident that something would be done to see the matter from their point of view and that they would be consulted before the order was finally made.

THROUGH 1950

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British Trade Notes

Monsanto Chemicals, Ltd., recently held a six-day export agents' convention in London, when new Monsanto products were described, and trading problems in the United States, South Africa, India, Europe, and Near and Middle East, were discussed. Agents of 19 countries attended. Among those present besides E. A. O'Neal, chairman of Monsanto Chemicals, Ltd., and other officials of the British concern, were F. N. Williams, H. G. Johnson, and M. Young, respectively vice president and general manager of the Plastics division, head of the development division and director of the foreign department of the American parent company. Monsanto Chemical Co., Monsanto Chemicals (Australia), Ltd., was represented by C. Hudson, sales manager.

Herbert Rogers, director and general manager of Northern Rubber Co., Ltd., has been nominated president of the Institution of the Rubber Industry for 1950. At the same time it is learned that E. A. Murphy will receive the Colwyn Medal for 1949 for his work in the development of latex.

Petrochemicals, Ltd., which produces various chemicals from oil, has increased its capital of £3,200,000 to £4,700,000 by issuing an additional £1,500,000 in £1 ordinary shares.

Eric Miller recently celebrated a half century of service with Harrisons & Crosfield, of which he has been chairman 25 years. To commemorate the occasion, Mr. Miller was presented with his portrait painted by Maurice Codner.

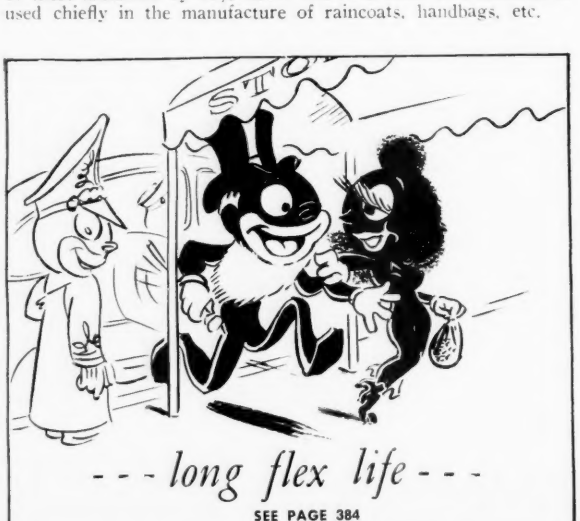
Hess Products, Ltd., Leeds, recently was formed to produce pure fatty acids under license from Armour & Co., Chicago, Ill., U.S.A. The fatty acids will be sold in Britain under the trade name, "Destec."

A new factory for chemical research and manufacture recently was opened by Imperial Chemical Industries, Ltd., at Wilton, on Tees-side. This factory is part of a huge project begun some years ago on the 2,000 acre side at Wilton and expected to be completed by 1953. The eventful scope of the Wilton works will be based chiefly on cracking oil for the production of basic organic chemicals and electrolysis of brine for producing chlorine and caustic soda. The company has a plastics division at Wilton, operating two plants, which is already in production.

HUNGARY

Production of rubber goods in Hungary is said to have increased by 38% over last years' level. Output of so-called peasant (work) boots has increased from 250,000 pairs last year to 360,000 pairs this year. Manufacture of rubber foam for seats and cushions has been developing rapidly; it started at 1,000 kilograms per month, rose to 3,000 kilograms, and is expected to reach 6,000 kilograms a month by the end of 1949.

Progress is also reported in the production of plastics. The Hungarian Rubber Works claims to have increased its output of these materials by 50% above the 1948 rate. The material is used chiefly in the manufacture of raincoats, handbags, etc.



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Editor's Book Table

BOOK REVIEWS

"Meet the Plastics." Clark N. Robinson. Macmillan Co., 60 Fifth Ave., New York, N. Y. Cloth, 6 by 9¼ inches, 182 pages. Price, $3.75.

Intended for the non-specialist, this book gives an understandable discussion of plastics, their characteristics, uses, special values, and limitations in comparison with other materials, methods of manufacture, and sources of supply. Beginning with a simple description of the basic chemistry of plastics and their properties, the author then discusses the plastics industry and its branches. Vocational opportunities in the field are pointed out, making the volume of special value to students and beginners in the plastics industry.

Following a general introduction, there are chapters devoted to plastics materials; plastics ingredients; molding, extruding, casting; laminates, adhesives, coatings, fibers; the plastics industry; the plastics reearch laboratory; molding plants and fabricating plants; plastics as handicraft materials; opportunities in the plastics industry; and the consumer and the plastics. Appendices include lists of materials manufacturers, plastic materials, schools offering training courses in plastics, and trade publications, together with a bibliography and subject index.

"Training Employes and Managers for Production and Teamwork." Earl G. Planty, William S. McCord, and Carlos A. Efferson. With a foreword by Robert W. Johnson. The Ronald Press Co., New York, N. Y. Cloth, 6 by 9 inches. 288 pages. Price $5.

In his foreword Robert W. Johnson, chairman of the board of directors of Johnson & Johnson, states that the authors "have proved that training pays—for the company, for the workers and for our company. They have written a book full of actual 'know-how.' They write from experience and from a successful record in companies whose training departments are performing these tasks and using the methods recommended. With other corporations that are equally advanced, they have established training as a proved means of solving urgent problems of labor-management relations and plant efficiency."

The book is divided into three parts. Part I introduces the broad concepts which have developed in recent years in the field of business and industrial training. It answers the questions of executives, managers, and others who want to know specifically what training is and what it will do for its time, trouble, and cost. As one of the basic principles, it is said:

"Industrial training today should continuously educate all levels in each of three fundamentally important areas: (1) skill, (2) knowledge, and (3) attitude. Therefore we can be guided in determining what to teach by recognizing that long-time plans should contain courses and other training devices of sufficient kind and variety to educate all continuously in each of the three major areas."

Part II of this book deals with the organization and administration of training and is designed primarily to assist those who are responsible for setting up a training department, selecting and training a staff, and also for planning the operation of the training program.

Part III, devoted to training programs and methods, is chiefly for training directors and for managers who are responsible for carrying out the training program. Dealing with practical operations, this section tells how to do the job.

"Who's Who in Plastics, 1948-1949." The Society of the Plastics Industry, Inc., 295 Madison Ave., New York 17, N. Y. Cardboard, 6 by 9 inches, 268 pages. Price: $4.50 to members; $5.50 to non-members.

This first edition of the "Who's Who" provides information on the affiliation, experience, and training of some 2,989 persons in the plastics industry. A company section lists company names, addresses, key officers and their positions, products, and methods of manufacture. By consulting the biographical and company sections it is possible to see the complete picture of an organization and its leaders. Data also are given on Society members both in this country and throughout the world. Other sections of the book present brief descriptions of the work of the various SPI committees, SPI officers and directors, and information on Society activities.

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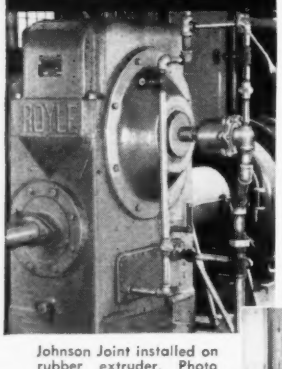
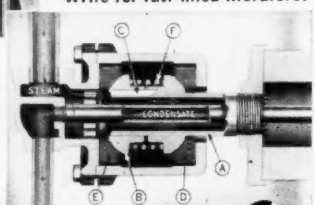


Johnson Joint installed on rubber extruder. Photo courtesy of Manhattan Rubber Div., Raybestos-Manhattan, Inc.



Rotating member consists of Nipple (A) and Collar (B), keyed together (C). Seal ring (D) and bearing ring (E) are of self-lubricating carbon graphite. Spring (F) is for initial seating only; joint is pressure sealed in operation.

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NEW PUBLICATIONS

"Cabot Carbon Blacks under the Electron Microscope." Vol. II, No. 10. October, 1949. Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass. 90 pages. After an introduction reviewing the importance of particle size study of carbon black, this booklet gives an electron micrograph, particle size and surface area data, and typical analytical properties of each of the company's individual carbon blacks. Color and ink, and carbon blacks are grouped together in two sections; while the final section describes the procedures used in determining the values presented.

"Products of Cabot Research Available to Industry." 4 pages. This folder lists the types of products made by Cabot, gives tabular data on the properties of its carbon blacks and pine products, and describes some special uses for carbon black in industry.

Publications of E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. **"Exposure Cracking Inhibitors for GR-S Compounds."** BL-234, November 15, 1949. 2 pages. Data show that a combination of Heliozone and NBC will economically protect a GR-S stock from exposure cracking under either dynamic or static conditions. **"Alamask Odorants for the Rubber Industry."** 8 pages. This folder lists the 14 types of Alamask odorants available and gives information on their selection and use in various types of rubber and latex products.

"A.S.T.M. Standards on Textile Materials (With Related Information)." American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. October, 1949. Paper, 586 pages. Price, $4.50. This latest edition of standards on textile materials, prepared by A.S.T.M. Committee D-13, gives in their current form 84 specifications, test methods, and tolerances, together with much other related information. In addition to the material standards and testing methods, there are tables on relative humidity, photomicrographs of fibers and fabric defects, yarn conversion tables, a glossary of textile terms, and appendices covering basic fiber properties and other related data.

"Spectrophotometry." NBS Circular 484. Kasson S. Gibson. Issued by National Bureau of Standards. 48 pages. Available from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price, 25¢. The techniques and data resulting from the Bureau's experience are presented in this guide so that users of spectrophotometers can better understand their instruments, properly calibrate and maintain them, and avoid the numerous errors common in such work. Topics include definitions of terms, design and operation of typical instruments, types of errors which occur, and presentation of standard data for checking the calibration. In addition, a bibliography of 127 related references is included.

"Chemigum Latex 101 in Paints." Techni-Guide #C-102. Goodyear Tire & Rubber Co., Inc., Akron 16, O. 7 pages. This bulletin gives full information on the use and advantages of Chemigum Latex 101, a styrene-butadiene latex, as a paint vehicle. Data presented cover formulation, mixing and preparation, and properties of the finished paints.

"Annotated Comprehensive List of Trade Names of Synthetics." T. R. Dawson and M. J. Thomsett. Research Association of British Rubber Manufacturers, 105-7 Lansdowne Rd., Croydon, England. Information Bureau Circular No. 372. Paper, 8 by 13 inches, 230 pages. Price, $10. This list of rubber and plastic trade names includes raw materials, compounding ingredients, and finished products, together with brief descriptions of each material. American products are also shown, but the special value of this listing lies in its comprehensive coverage of foreign materials and its resultant usefulness as a reference work.

"Dynel." Folder F-7427. Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York 17, N. Y. 6 pages. This bulletin presents properties, textile characteristics, and suggested applications of Dynel, the company's new staple fiber spun from a copolymer of acrylonitrile and vinyl chloride. Both chemical and physical properties of the fiber are given, and information on textile characteristics includes processing, sizing, bleaching, dyeing, and anti-static treatment.

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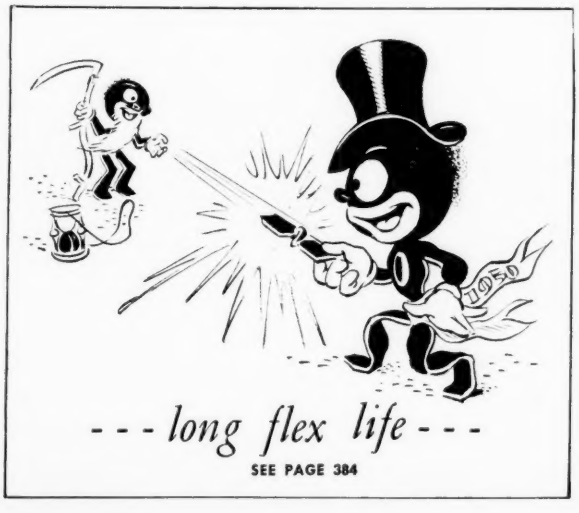

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Market Reviews

CRUDE RUBBER

Commodity Exchange

WEEK-END CLOSING PRICES

	Oct. 29	Nov. 26	Dec. 3	Dec. 10	Dec. 17	Dec. 24
Futures						
Feb.	16.22	16.87	17.06	17.63	17.22	17.76
Apr.	16.05	16.79	17.02	17.52	17.16	17.67
June	15.85	16.67	16.92	17.30	16.98	17.37
Aug.	15.70	16.57	16.84	17.10	16.78	17.14
Oct.	15.60	16.47	16.74	17.00	16.68	17.04
Dec.	15.50	16.37	16.64	16.90	16.58	16.94
Total weekly sales, tons	4,620	2,600	7,500	5,140	6,460	5,010

RUBBER futures prices on the New York Commodity Exchange reflected the advancing prices of the physical market during December. Most of the activity on the Exchange consisted of commission house and dealer buying, and there was relatively little speculation. Total activity, as measured by sales volume, was only moderate as compared to the advancing prices.

February futures opened the month at the low of 17.00¢, rose irregularly to 17.65¢ on December 12, fell back to 17.22¢ on December 17, then rose again to end the month at a high of 18.09¢. Other futures showed similar movement: May futures began at the low of 16.95¢ on December 1 and closed at a high of 17.80¢ on December 30. Total sales volume for the month was 21,300 tons as compared with 21,030 tons sold during November.

New York Outside Market

WEEK-END CLOSING PRICES

	Oct. 29	Nov. 26	Dec. 3	Dec. 10	Dec. 17	Dec. 24
No. 1 R.S.S.						
Dec.	16.25	16.88	17.13	17.63	17.38	17.88
Jan.-Mar.	16.13	16.88	17.13	17.63	17.38	17.75
Apr.-June	—	—	17.00	17.50	17.25	17.63
No. 3 R.S.S.	15.00	15.88	16.13	17.13	16.88	17.13
No. 2 Brown	13.88	14.75	15.13	16.00	16.13	16.38
Flat Bark	13.25	13.75	14.00	14.75	14.88	15.00

RUBBER prices on the New York Outside Market rose strongly during December as manufacturers whose inventories had become depleted because of cautious purchasing over a long period of time resumed active buying in the face of restricted production in the Far East and accelerated demand on the Continent. Since devaluation, physical rubber prices have fluctuated in a narrow range because manufacturers have bought in quantity only when prices were low and bought from hand to mouth at other times. This practice has led to slender inventories. Now, in the face of light offerings and forecasts of continued tightness in supplies, prices advanced as buyers endeavored to meet their needs.

According to trade observers, statistical positions point to an active market for at least the next few months, since increased world consumption and restricted production have placed domestic manufacturers in a position where they must buy rather than chance future losses. The government-fixed price for GR-S is expected to exert some stabilizing effect on the natural rubber price increases, but there is some belief that the tight position of natural rubber may force increases even above the 18.5¢ level of GR-S.

Demand on the Continent is said to be strong, and the London and Singapore markets showed corresponding price advances and general firmness. Adding to these advances was a report that Russia had ordered 10,000 long tons of Malayan rubber for shipment in January, thus ending the 100-day Russian lull in buying believed caused by devaluation.

Toward the end of December it was said that American manufacturers had bought enough rubber and were well stocked and in a position to wait out lower prices. The government also stayed out of the market during the month. Dealers were optimistic, however, and foresaw no break in the market in the immediate future.

A feature of the physical market during December was the narrowing of the differential between No. 1 sheets and the off-grades. Whereas the discount between No. 1 and No. 3 sheets was as much as 2.13¢ two months ago, December saw a differential of only 0.5¢ between these grades. This trend can be explained by the tendency of consumers to substitute off-grades for No. 1 sheets during a period of advancing prices, but the present differentials more closely approximate the normal prewar relation between the basis and off-grades.

The spot price for No. 1 R.S.S. started the month at the low of 17.00¢, fluctuated between 17.38¢ and 17.63¢ for the next two weeks, rose to 18.00¢ on December 21 and closed the month at the high of 18.13¢. After starting the month at 16.00¢, a 1¢ discount from the No. 1 sheet price, No. 3 R.S.S. closed the gap and advanced to end the month at a high of 17.63¢. No. 2 Brown rose from a low of 15.00¢ on December 1 to a high of 17.00¢ on December 28-30; while Flat Bark showed an advance from 14.00¢ to 15.13¢.

Latices

THE reported total of 4,052 long tons, dry weight, of *Hevea* latex consumed during October has been a surprise to the industry, according to Arthur Nolan, Latex Distributors, Inc., writing in Lockwood's December *Rubber Report*. Such an increase of 392 long tons over September consumption was not considered likely since most foam factories had operated fully in September. A study of the October figures shows foam consumption at about 2,000 tons, with the remainder being used in non-foam applications.

Hevea latex imports during October totaled 2,634 long tons; while month-end stocks were 4,162 long tons. Stocks are now down to a 30-day position, and since stocks plus shipments are already known to be inadequate to support a 4,000-ton monthly consumption, it appears that usage must fall off. Sufficient supplies to support this consumption level are not expected to be available until some time early in 1950.

On December 8, *Hevea* latex bulb prices rose from the previous level of 24.5-26.5¢ to the current 25.5-27.5¢ a pound. This increase was expected in view of the advancing crude rubber prices in order to provide necessary stimulation to latex producers.

GR-S latex production during October was 1,898 long tons, dry weight; consumption, 1,546 long tons; and month-end stocks, 1,520 long tons. The slow but steady decline in GR-S stocks can be attributed to "fill-in" use where insufficient *Hevea* latex is available. GR-S latex usage is expected to increase while the *Hevea* shortage continues in order to maintain volume and act as a brake to higher natural latex prices. GR-S latex bulk prices during December remained unchanged at 18.5-20.25¢ a pound.

RECLAIMED RUBBER

SALES of reclaimed rubber during December rose to about 8% above the November level and were approximately equal to the October sales volume. Despite increased consumption of natural rubber during October, the outlook for the reclaim industry is still optimistic since consumption data for October indicate that the consumpion ratio of reclaim to new rubber was better than had been expected.

Final September and preliminary October statistics on the domestic reclaimed rubber industry are now available. September production totaled 18,304 long tons; consumption, 18,517 long tons; exports, 761 long tons; and month-end stocks, 26,257 long tons. Preliminary figures for October give a production of 20,682 long tons; consumption, 19,635 long tons; exports, 1,107 long tons; and month-end stocks, 26,664 long tons.

No changes in reclaimed rubber prices occurred last month, and current prices follow:

Reclaimed Rubber Prices

	Sp. Gr.	¢ per lb.
Whole tire	1.18-1.20	8.25/ 8.75
Peel	1.18-1.20	8.25/ 9.25
Inner tube		
Black	1.20-1.22	11.50/12.50
Red	1.20-1.22	14 /14.5
GR-S	1.18-1.20	9.5 /10
Butyl	1.16-1.18	8.5 / 9
Shoe	1.50-1.52	8.25/ 8.75

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

SCRAP RUBBER

MODERATE activity was reported in the scrap rubber market during December. Scrap movement was fairly active during the first half of the month, but then slowed down owing to inventory taking and the normal year-end letdown in business. All grades of scrap were said to have been sold, with demand centered on No. 1 peelings, mixed tires, and red tubes. Occasional demand for specialty stocks was also noted.

The improvement of the market during the past few months was reflected in several price changes. Mixed auto tires advanced in the East from $13 to $13.50 a net ton, corresponding to the Akron price. Red passenger tubes rose from 7¢ to 7.5¢ a pound both in the East and at Akron. Scrap rubber export business was very slow during December. Some supplies were said to have been shipped to Spain and France, but the total volume was small.

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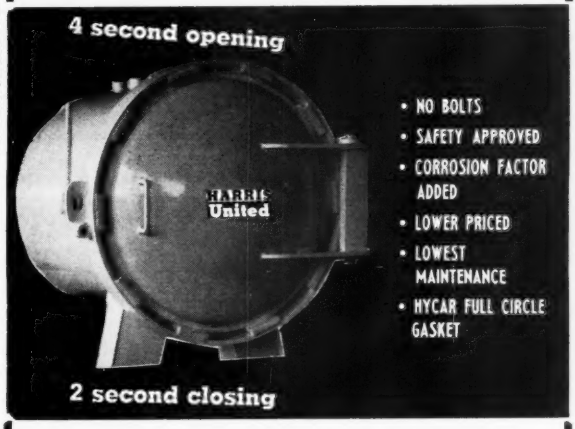

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Following are dealers' selling prices for scrap rubber, in carload lots, delivered to mills at points indicated:

	Eastern Points	Akron, O.
	(Per Net Ton)	
Mixed auto tires	$13.50	$13.50
Peelings, No. 1	52.25	52.25
3	30.25	30.25
	(¢ per Lb.)	
Black inner tubes	4.00	4.00
Red passenger tubes	7.50	7.50

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NEW YORK COTTON EXCHANGE
WEEK-END CLOSING PRICES

Futures	Oct. 29	Nov. 26	Dec. 3	Dec. 10	Dec. 17	Dec. 24
Mar.	29.84	29.91	30.14	30.18	30.56	30.66
May	29.83	29.88	30.08	30.07	30.38	30.42
July	29.44	29.61	29.66	29.52	29.78	29.80
Oct.	27.91	28.19	29.20	27.95	28.33	28.39
Dec.	27.84	28.12	28.12	27.83	28.22	28.28
Mar.	27.80	28.07	28.00	27.75	28.13	28.18

COTTON prices rose steadily during December owing to aggressive mill demand, good export interest, and a general optimistic sentiment based on the cotton growers' vote favoring acreage controls. On the export side, ECA announced allotments for cotton purchases to Italy, Austria, Netherlands, Western Germany, Denmark, and Korea for a total of about $86,000,000. These allotments more or less complete the ECA program for the season, and some observers believe that a dip in export buying after the first of the year, coupled with the usual slump in mill demand, will leave the cotton market vulnerable to price declines.

On the referendum conducted by the United States Department of Agriculture, approximately 89% of the farmers voting favored a return to prewar production controls to hold down cotton crop surpluses. The proposal was first advanced because current supplies are far in excess of prospective market needs. Under the new control program the cotton acreage next year is to be about 21,000,000, instead of the past season's 27,000,000 acres.

News from Washington indicates that Congress, when it reconvenes, will get a bill to provide for re-allocation of unused portions of cotton acreage quotas, thus easing the cuts some growers are taking. In addition, action may be taken to build cotton storage facilities for next season's crop, since the 9,000,000-bale surplus of the current crop is expected to exceed storage space during the Summer of 1950.

As for actual price movements on the Cotton Exchange, the 15/16-inch middling spot price began the month at the low of 30.67¢ and rose irregularly to close the month at a high of 31.50¢. Similar movement was shown by March futures prices, which started at the low of 29.99¢ on December 1 and reached a high of 30.78¢ on December 30.

Fabrics

The cotton gray goods market reported active sales during December, except for the usual pre-holiday lull. Large quantities of chafer fabrics were bought by tire companies for delivery in January, with the entire line of single-ply goods being in greatest demand. Headlinings were in a fairly tight position for the first quarter, and sales were reported as far ahead as March.

Sateens enjoyed a good market throughout the month, with deliveries during January and February to the coating trade. Business was good in wide drills, single filling ducks, and hose and belting ducks. Many orders were placed in these fabrics for delivery during the first quarter, and a continued improvement in demand is expected for the next few months. Although not selling so strongly as certain other fabrics, wide ducks were in a strong position and enjoying continued demand.

The market in osnaburgs was only moderate in view of the tight supply situation, although some sales into February were reported. Print cloths reported strong inquiries for most numbers into the second quarter, and sales volume increased steadily. The sheeting market also enjoyed strong demand, with earliest deliveries reported to be about March 31.

Cotton Fabrics

Drills		
59-inch 1.85-yd.	*yd.*	$0.365
2.25-yd.		.32/.33
Ducks		
38-inch 1.84-yd. S. F.	*yd.*	.425
2.90-yd. D. F.		.31/.325
51.5-inch 1.35-yd. S. F.		.4575/.46
66-inch 1.02-yd. S. F.		.73
Hose and belting		.58
Osnaburgs		
40-inch 2.11-yd.	*yd.*	.24
Raincoat Fabrics		
Bombazine, 64x60 5.35-yd.	*yd.*	.235
Print cloth, 38½-inch, 64x60		.17
Sheeting, 48-inch, 4.17-yd.		.21
52-inch 3.85-yd.		.2225
Chafer Fabrics		
14-oz./sq. yd. Pl.	*lb.*	.635/.65
11-65-oz./sq. yd. S.		.58/.60
10-80-oz./sq. yd. S.		.62
8.9-oz./sq. yd. S.		.635
14-oz./sq. yd. S.		.59
Other Fabrics		
Headlining, 59-inch 1.35-yd. 2-ply	*yd.*	.565
64-inch 1.25-yd. 2-ply		.6063
Sateens, 53-inch 1.32-yd.		.57
58-inch 1.21-yd.		.6238
Tire Cords		
K. P. std., 12-3-3	*lb.*	.685
12-4-2		.675

RAYON

SHIPMENTS of rayon to domestic consumers during November totaled 99,700,000 pounds, almost equal to the October record figure. Substantial portions of the August-November shipments were made out of inventory, and, with inventory on November 30 down to about 33% of the mid-year total, rayon shipments from now on will more closely reflect actual production figures.

November deliveries of rayon filament yarn at 75,500,000 pounds were 1% above the October level. Viscose and cupra yarn shipments, accounting for 49,300,000 pounds of the November total, were composed of 24,100,000 pounds of high-tenacity yarn and 25,200,000 pounds of "textile" type yarn. Rayon stocks held by producers at the end of November totaled 23,100,000 pounds, 21% below the October figure.

No changes were made in rayon tire yarn and fabric prices during December, and current prices follow:

Rayon Fabrics

Tire Yarns			
1100/480	$0.55		
1100/490	.55		
1150/490	.55		
1650/720	.54		
1650/980	.54		
1900/980	.54		
2200/960	.53		
2200/980	.53		
4400/2934	.55	/	$0.56
Tire Fabrics:			
1100/490/2	.67		
1650/980/2	.645	/	$0.66
2200/980/2	.63		

Compounding Ingredients—Price Changes and Additions

Accelerator-Activators, Inorganic			
Litharge, National Lead	*lb.*	$0.1475	
Red lead, National Lead	*lb.*	.1575	
White lead, National Lead	*lb.*	.1475 /	$0.1575
Silicate, National Lead	*lb.*	.14⅜ /	.14⅞
Accelerator-Activators, Organic			
Emersol 110	*lb.*	.1225 /	.1325
120	*lb.*	.1325 /	.1425
130	*lb.*	.155 /	.165
Emery 600	*lb.*	.08 /	.1025
Hyfac 430	*lb.*	.13 /	.14
431	*lb.*	.14 /	.15
Chemical Stabilizers			
Dutch Boy Plumb-O-Sil A	*lb.*	.28	
B	*lb.*	.295	
DS-207	*lb.*	.5025	
Dythal	*lb.*	.375	
Normasal	*lb.*	.4175	
Tribase	*lb.*	.2425	
E	*lb.*	.2075	
Latex Compounding Ingredients			
DC Antifoam A	*lb.*	5.65 /	6.65
Odorants			
Alamasks	*lb.*	.60 /	6.50
Plasticizers and Softeners			
Bunarex resins	*lb.*	.05 /	.11
Emersol 110	*lb.*	.1225 /	.1325
120	*lb.*	.1325 /	.1425
130	*lb.*	.155 /	.165
Emery 600	*lb.*	.08 /	.1025
Hyfac 430	*lb.*	.14 /	.15
431	*lb.*	.15 /	.16
Monoplex DBS	*lb.*	.51 /	.52
DOS	*lb.*	.555 /	.565
Paraplex G-25	*lb.*	.69 /	.70
Picco-75,-100	*lb.*	.115 /	.165
480 Oilproof Resin	*lb.*	.135 /	.185
Piccoumaron resins	*lb.*	.055 /	.195
Reinforcers, Other Than Carbon Black			
Bunarex resins	*lb.*	.05 /	.11
Picco-75, -100	*lb.*	.115 /	.165
Piccoumaron resins	*lb.*	.055 /	.195
Solvents			
Picco Hi-Solv solvents	*gal.*	.17 /	.265
Tackifiers			
Bunarex resins	*lb.*	.05 /	.105
Piccoumaron resins	*lb.*	.055 /	.195
Vulcanizing Agents			
Litharge, National Lead	*lb.*	.1475	
Red Lead, National Lead	*lb.*	.1575	
White lead silicate, National Lead	*lb.*	.14⅜ /	.14⅞

Trade Marks

(*Continued from page 466*)

sealers, thinners, etc. Coating Materials Laboratories, Inc., Belleville, N. J.

512,064. **Comasyn.** Paints, sealers, thinners, etc. Coating Materials Laboratories, Inc., Belleville, N. J.

512,065. **Comaflex.** Pairts, etc. Coating Materials Laboratories, Inc., Belleville, N. J.

512,092. **Ariel.** Footwear. Mishawaka Rubber & Woolen Mfg. Co., Mishawaka, Ind.

512,104. Representation of a seal containing the words: **"Seal Fast,"** below the word: **"Bowes."** Cables, tire vulcanizers, and batteries. Bowes "Seal-Fast" Corp., Indianapolis, Ind.

512,123. **All Weather.** Footwear. Goodyear Tire & Rubber Co., Akron, O.

512,130. **Twin-Flex.** Corsets, girdles, etc. La Resista Corset Co., Bridgeport, Conn.

512,132. Representation of the letter: **"R"** on which are the words: **"Pennsylvania Station New York"** and an oval containing the words: **"Ryanbury John W. Ryan, Inc."** and an inner oval containing a representation of a crest and the words: **"English Shops."** Raincoats. John W. Ryan English Shops, Inc., New York, N. Y.

512,257. **Vinalon.** Plastic coated fabrics. Golding Bros. Co., Inc., New York, N. Y.

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United States Imports, Exports, and Reexports of Crude and Manufactured Rubber

	September, 1949	
	Quantity	Value
Imports for Consumption of Crude and Manufactured Rubber		
UNMANUFACTURED, Lbs.		
Crude rubber	97,387,010	$14,069,331
Rubber latex	4,802,243	1,095,225
Balata	466,228	122,732
Jelutong or Pontianak	203,536	74,605
Gutta percha	48,176	31,672
Synthetic rubber	4,672,174	816,949
Scrap rubber	741,307	17,751
TOTALS	108,330,674	$16,228,265
MANUFACTURED		
Tires: auto, truck, bus *no.*	130	$853
Bicycle *no.*	2,350	4,841
Inner tubes: auto, etc. *no.*	6	16
Rubber footwear:		
Boots *prs.*	24	276
Shoes and overshoes *prs.*	20,648	44,453
Rubber-soled canvas shoes *prs.*	29	75
Athletic balls: golf *no.*	432	192
Other, except tennis *no.*	117,036	11,568
Rubber toys, except balloons	....	23,585
Hard rubber products	....	111
Rubberized printing blankets *lbs.*	719	1,289
Rubber gaskets and valve packing	....	146
Insulators	....	689
Belting *lbs.*	9,516	13,563
Hose and tubing	....	1,696
Drug sundries	....	1,194
Gutta percha manufactures *lbs.*	2,850	2,063
Rubber heels and soles *lbs.*	665	328
Synthetic rubber products	....	217
Other soft rubber manufactures	....	48,682
TOTALS	....	$155,837
GRAND TOTALS, ALL RUBBER IMPORTS	....	$16,374,102
Exports of Domestic Merchandise		
UNMANUFACTURED, Lbs.		
Chicle and chewing gum bases	428,041	$200,930
Balata	780	2,145
Synthetic rubbers: GR-S	111,283	29,089
Neoprene	664,460	228,383
Nitrile	151,500	71,242
"Thiokol"	5,992	6,953
Polyisobutylene	15,418	3,296
Other, except Butyl	2,829	4,927
Reclaimed rubber	1,705,347	128,605
Scrap rubber	2,211,882	74,971
TOTALS	5,297,532	$750,541
MANUFACTURED		
Rubber cement *gals.*	74,105	$87,747
Rubberized fabric:		
Auto cloth *sq. yds.*	10,249	8,887
Piece goods and hospital sheeting *sq. yds.*	78,334	49,948
Rubber footwear: boots *prs.*	9,188	34,361
Shoes *prs.*	5,624	7,289
Rubber-soled canvas shoes *prs.*	36,552	65,958
Rubber soles *doz. prs.*	45,714	75,173
Heels *doz. prs.*	37,844	35,281
Soling and top-lift sheets *lbs.*	105,335	29,029
Gloves and mittens *doz. prs.*	10,399	33,213
Drug sundries: hot water bottles and fountain syringes *no.*	28,651	17,407
Other	....	190,222
Rubber and rubberized clothing	....	69,367
Toy and novelty balloons	....	44,930
Rubber toys and balls	....	51,658
Erasers *lbs.*	8,796	7,233
Hard rubber goods:		
Battery boxes *no.*	15,070	21,092
Other electrical goods *lbs.*	92,564	83,051
Combs, finished *doz.*	2,988	3,461
Other	....	6,909
Tires and casings:		
Truck and bus *no.*	92,087	3,249,539
Auto *no.*	31,015	455,619
Aircraft		83,295
Farm tractor, etc. *no.*	9,931	249,655
Other off-the-road *no.*	1,945	230,408
Bicycle *no.*	8,509	13,115
Motorcycle *no.*	790	6,142
Other *no.*	2,040	39,174
Inner tubes:		
Auto, bus, truck *no.*	81,303	261,458
Other *no.*	11,242	36,592
Solid tires:		
Truck and industrial *no.*	1,689	73,074
Other *lbs.*	1,814	526
Tire repair materials:		
Camelback *lbs.*	153,215	42,327
Other *lbs.*	154,988	127,155
Rubber and friction tape *lbs.*	48,820	$28,835
Belting:		
Auto and home *lbs.*	80,299	85,828
Transmission: V-belts *lbs.*	100,884	165,993
Flat belts *lbs.*	19,687	21,853
Other *lbs.*	29,325	30,968
Conveyer and elevator *lbs.*	131,417	101,644
Other *lbs.*	19,633	24,161
Hose and tubing *lbs.*	429,730	324,225
Rubber packing *lbs.*	112,709	100,556
Mats, flooring, tiling *lbs.*	809,815	176,658
Thread, bare *lbs.*	19,908	31,312
Textile covered *lbs.*	12,691	34,310
Gutta percha manufactures *lbs.*	1,078	1,236
Latex and other compounded rubber for further manufacture *lbs.*	457,284	112,878
Other natural and synthetic rubber manufactures	....	353,583
TOTALS	....	$7,384,435
GRAND TOTALS, ALL OTHER EXPORTS	....	$8,134,976
Reexports of Foreign Merchandise		
UNMANUFACTURED, Lbs.		
Crude rubber	1,245,938	$248,921
Balata	5,398	1,889
Chicle and chewing gum bases	61,161	78,591
TOTALS	1,312,497	$329,401
MANUFACTURED		
Rubber soling and toplift sheets *lbs.*	17,316	$8,430
Toy and novelty balloons	....	175
Rubber toys and balls	....	10,994
Tire casings: truck and bus *no.*	14	1,510
Tires, solid: truck and industrial *no.*	7	420
Other natural and synthetic rubber manufactures	....	6,323
TOTALS	....	$27,528
GRAND TOTALS, ALL RUBBER REEXPORTS	....	$357,283

SOURCE: Bureau of Census, United States Department of Commerce, Washington, D. C.

United States Rubber Statistics—September, 1949

(All Figures in Long Tons, Dry Weight)

	New Supply			Distribution		Month' End
	Production	Imports	Total	Consumption	Exports	Stocks
Natural rubber, total	0	43,476	43,476	40,318	556	94,872
Latex, total	0	2,144	2,144	3,660	0	5,746
Rubber and latex, total	0	45,620	45,620	43,978	556	100,618
Synthetic rubber, total	*26,396 †4,482	2,086	32,964	32,443	415	110,848
GR-S	*22,787 †684	1,880	25,351	25,657	50	89,983
Neoprene	3,045	0	3,045	2,639	297	3,857
Butyl	*3,609	206	3,815	3,508	0	13,706
Nitrile	†753	0	753	639	68	3,303
Natural rubber and latex, and synthetic rubber, total	30,878	47,706	78,584	76,421	971	211,466
Reclaimed rubber, total	18,304	0	18,304	18,517	761	26,257
GRAND TOTALS	49,182	47,706	96,888	94,938	1,732	237,723

SOURCE: Rubber Division, ODC, United States Department of Commerce, Washington, D. C.
*Government plant production.
†Private plant production.

Estimated Automotive Pneumatic Casings and Tube Shipments, Production, Inventory, October-September, 1949; First 10 Months, 1949, 1948

	October, 1949	% of Change from Preceding Month	September, 1949	First 10 Months, 1949	First 10 Months, 1948
Passenger Casings					
Shipments					
Original equipment	2,711,781		2,832,405	24,617,815	17,745,862
Replacement	3,004,533		2,944,107	31,396,714	36,440,551
Export	68,371		44,457	423,607	533,015
TOTAL	5,784,685	−0.62	5,820,969	56,438,136	54,719,428
Production	5,621,182	+13.54	4,950,727	54,724,461	57,174,671
Inventory end of month	7,015,899	— 1.53	7,124,640	7,015,899	8,002,433
Truck and Bus Casings					
Shipments					
Original equipment	229,839		223,271	3,048,619	4,464,904
Replacement	735,412		632,035	5,768,265	6,616,411
Export	89,668		69,978	816,000	948,458
TOTAL	1,054,919	+14.01	925,284	9,632,884	12,029,773
Production	878,835	+34.58	653,014	9,321,151	12,353,524
Inventory end of month	1,658,983	— 8.42	1,811,573	1,658,983	1,902,830
Total Automotive Casings					
Shipments					
Original equipment	2,941,620		3,055,676	27,666,434	22,210,766
Replacement	3,739,945		3,576,142	37,164,979	43,056,962
Export	158,039		114,435	1,239,607	1,481,473
TOTAL	6,839,604	+ 1.38	6,746,253	66,071,020	66,749,201
Production	6,500,017	+15.99	5,603,741	64,045,612	69,528,195
Inventory end of month	8,674,882	— 2.93	8,936,213	8,674,882	9,905,263
Passenger and Truck and Bus Tubes					
Shipments					
Original equipment	2,940,439		3,007,260	27,602,264	22,198,970
Replacement	2,538,032		2,766,312	27,529,458	35,540,336
Export	78,633		69,240	778,329	910,970
TOTAL	5,557,104	— 4.89	5,842,812	55,910,051	58,650,276
Production	5,295,630	+ 8.02	4,902,319	55,102,309	59,539,335
Inventory end of month	8,643,678	— 3.05	8,915,678	8,643,678	8,915,443

NOTE: Cumulative data on this report include adjustments made in prior months.
SOURCE: The Rubber Manufacturers Association, Inc., New York, N. Y.

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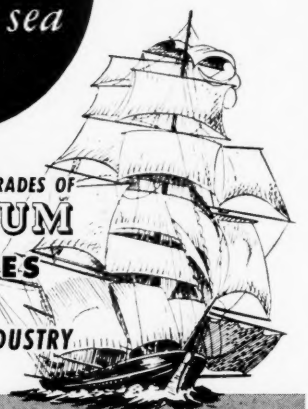

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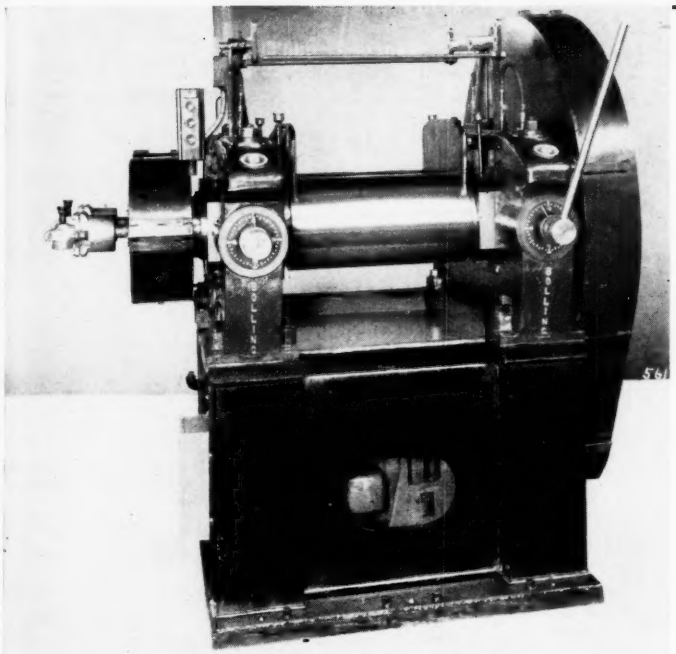

Illustration Frame #3. 12-12 x 24" (or 30") Mill on cabinet type base. Under-mounted motor.

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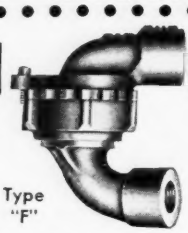

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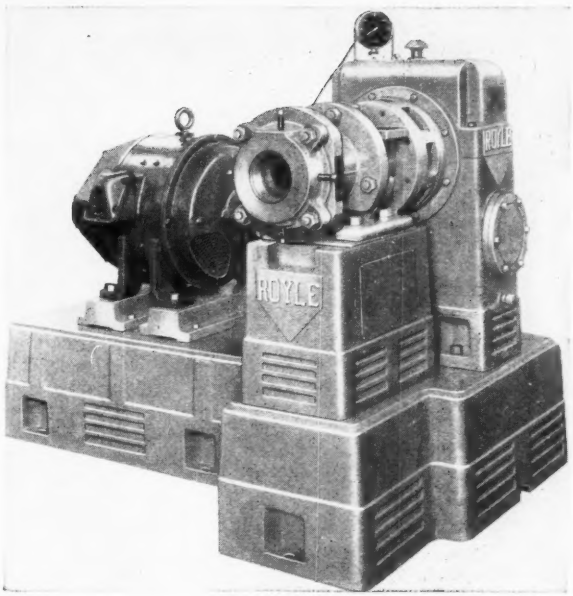

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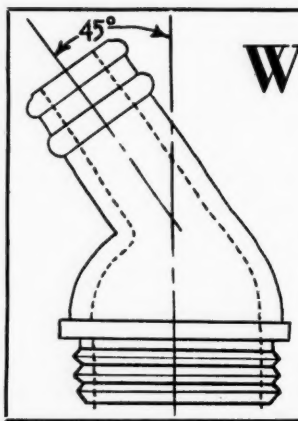

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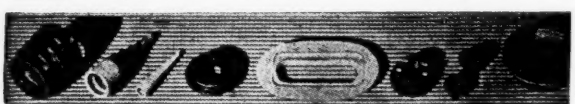

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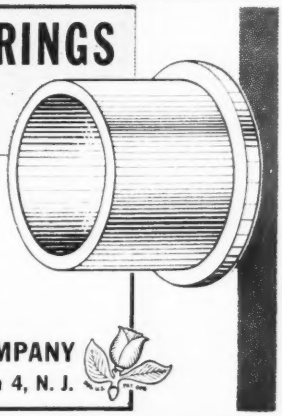

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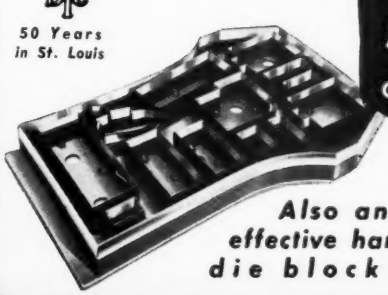

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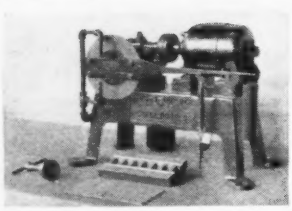

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Stock adhesions at any point in production mean time lost and extra expense. You can avoid such headaches by using Climco Processed liners that can be readily peeled from the stock without sticking.

Climco Processing of your liners assures many other profitable advantages: Liner life is greatly increased, tackiness of the stock is preserved, and gauges are more easily maintained. Latitude in compounding is enlarged, lint and ravelings are eliminated and horizontal storage is facilitated.

Since 1922 Climco Processed Liners have proved their worth to the rubber industry. Give them a trial in your plant.

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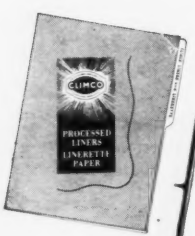

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